PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
For Leasing Activities

United States Department of the Interior
Bureau of Indian Affairs

Osage Agency
Pawhuska, Oklahoma

Osage Nation Mineral Reservation

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

1.0 PROPOSAL AND NEED FOR THE PROPOSAL

Oil and gas leasing actions have been proposed within the Osage Nation Mineral Reserve (Reserve) in Osage County, Oklahoma. The Bureau of Indian Affairs (BIA) Osage Agency is the surface management agency responsible for all lands held in trust by the United States for the Osage nation as well as restricted allotments owned by individual Tribal members within Osage County, Oklahoma. The BIA's general mission is to represent the interests, including the trust resources, of members of the Osage Nation. All Osage Mineral Shareholders could benefit substantially from the development of oil and gas exploration in the Reserve. This environmental assessment (EA) addresses the potential impacts associated with the Proposed Action which is the leasing of Osage mineral estate lands. Subsequent oil exploration, drilling and production activities that may occur as a result of the leasing actions, are required to comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements and will require additional analysis of environmental impacts.

Approval of leases related to the BIA's oil and gas program is essential to guarantee the continued opportunity for the Osage Nation to obtain economic stability and accomplish the BIA mission to develop, conserve and preserve Tribal trust assets. The purpose of these lease approvals is to ensure that the Federal obligations of the United States to Federally recognized Tribes are met and that the action is conducted in accordance with Federal laws and regulations that protect, enhance and preserve natural and cultural resources, including, without limitation, applicable provisions of 25 CFR Part 226 and the National Environmental Policy Act of 1969 (NEPA), as amended.

2.0 FEDERAL AND OTHER RELEVANT REGULATIONS AND AUTHORITIES

Leasing actions, oil and gas exploration and subsequent development activities are conducted under the authority of the Code of Federal Regulations, Title 25, Part 226, Leasing of Osage Reservations Lands for Oil and Gas Mining, as well as the Congressional Act of June 28, 1906, as amended, which created the Osage Nation Minerals Reserve. The BIA's role, in respect to the Osage Nation Minerals Estate, covers all leasing, permitting and associated realty actions, as required. The BIA is also tasked with on-site monitoring of construction and production activities as well as resolution of any dispute that may arise as a result of any of the aforementioned actions. Federal actions authorizing mineral extraction must comply with the National Environmental Policy Act of 1969 (NEPA), Section 7 of the Endangered Species Act (Section 7[a] [2]) (ESA) and Section 106 of the National Historic Preservation Act of 1966 (NHPA), among others.

The Proposed Action represents a BIA federal action and will include an analysis of environmental impacts, which complies with Title 43, Code of Federal Regulations (CFR), Part 46, Implementation of the National Environmental Policy Act (NEPA) of 1969 for the Department of the Interior, 59 Indian Affairs Manual 3-H, the BIA NEPA Guidebook and other applicable laws.

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This Environmental Assessment (EA) references multiple other documents and contains standard language that describes the affected human environment of Osage County and summarizes the BIA Osage Agency minerals program activities. The Appendix of this EA contains a list of required best management practices, land management goals, objectives, and includes an in-depth analysis of the potential impacts of the BIA federal action on the affected human environment. Should actual drilling, production, development and establishment of transportation infrastructure occur then public notice and opportunity for comment would be required.

Leasing and possible development of leased tracts must comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. After a lease is granted, no disturbance of any kind can begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place. Prior to issuance of an Application for Permit to Drill (APD) or similar minerals action, either the Applicant or the BIA must provide documentation to demonstrate compliance with NEPA. The NEPA document will contain appropriate conditions of approval and the Applicant must agree to take all appropriate actions, to avoid, minimize and mitigate unacceptable environmental consequences. Applicants must also agree to follow all best management practices (BMPs) and appropriate monitoring mitigations.

This EA analyzes potential impacts to the environmental and socio-economic resources, known collectively as the human environment, for both the No Action Alternative (described in Section 3.2) and the Proposed Action. Impacts may be beneficial or detrimental, direct or indirect, and short-term or long-term. This EA also analyzes the potential for cumulative impacts and ultimately makes a determination as to the significance of any impacts.

In the absence of significant negative consequences, this EA would result in a Finding of No Significant Impact. Should significant adverse impacts be identified as a result of the direct, indirect, or cumulative effects of the Proposed Action, then NEPA requires the preparation of an environmental impact statement. It should be noted that a significant benefit from the project does not necessarily, but could require preparation of an environmental impact statement.

Development or surface disturbance of any kind would require additional review of environmental and socio-economic factors. The Lessee also agrees to follow all best management practices (BMPs) and monitoring mitigations listed in this document. No disturbance of any kind would begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place, if deemed appropriate.

SUMMARY OF PROGRAM[1]

Osage County, the study area for the program considered herein, is the largest of 77 counties in Oklahoma, encompassing a total of 1,476,480 acres. As shown in Figure 1, it is located in the northeastern portion of the State. Osage County is bordered by Kansas on the north, the Arkansas River on the southwest, Tulsa County on the southeast, and Washington County on the east. Pawhuska, the county seat, is centrally located. Although the majority of the study area is sparsely populated, an extension of metropolitan Tulsa has produced an urban area at

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

the far southeastern corner of the county. Except for large flood plains along the Arkansas River and several other major streams, the topography of the county is characterized by gently rolling hills. These hills are generally covered by native grassland and wooded lands and are used primarily for cattle grazing.

In the late 1800's, to satisfy the need for a permanent homeland, the Osage Nation purchased 1,469,077 acres of Oklahoma Territory land at about $0.70 per acre from the Cherokee Indians. A Congressional Act of June 16, 1906, which granted statehood to Oklahoma, provided that the Osage Indian Reservation would be established as a separate county of the state. This legislation incorporated most Osage Nation affairs with Oklahoma State government, but an Act of June 28, 1906 (as amended), specifically placed mineral management and development and its financial control under Federal jurisdiction.

Oil and gas development began in the county on March 16, 1896 when the first oil and gas lease was obtained by Edwin B. Foster of Rhode Island. That lease covered all of the Osage mineral reserve and was for 10-year duration. This initial lease was extended for an additional 10 years, but then covered only the eastern half of the county. Starting on April 20, 1916, leases were sold at public auctions, which now are held three times annually. Tracts could then be leased either for oil or gas. Combination oil and gas leasing began in October of 1974. The first oil well was completed in Osage County in March 1897 as a dry hole. The first producing oil well was brought in on October 28, 1897, and the first oil from the well was sold in May 1900. About 34,000 wells have been completed in Osage County since oil and gas development began. (BIA, 1979)

Since 1906 responsibility for the Osage oil and gas leasing program has been defined through a sequence of Federal legislation. Currently, the U.S. Department of the Interior, Bureau of Indian Affairs, supervises the leasing program through the Osage Agency Office in Pawhuska, Oklahoma. The Secretary of the Interior, or his authorized representative, is ultimately responsible for approval of leases. The Superintendent of the Osage Agency is the BIA employee with this delegated authority. The Federal involvement with the Osage Nation oil and gas leasing program has been deemed a Federal action requiring compliance with Title 43, Code of Federal Regulations (CFR), Part 46, Implementation of the National Environmental Policy Act (NEPA) of 1969 for the Department of the Interior, and 59 IAM 3-H, the BIA NEPA Guidebook. (BIA, 2012)

MINERALS PROGRAM OPERATIONS[1]

The minerals program in Osage County is operated by the Superintendent of the Osage Agency. Primary components of the program operations include leasing of nominated tracts and possible geophysical exploration, well drilling, energy production, well abandonment, transportation systems, and safety and environmental controls.

Program Background

The structure and magnitude of the present oil and gas leasing program in Osage County results from a sequence of legislative decisions, the availability of energy resources in the

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

county, the national demand for energy, and the improvement of petroleum extraction technologies. Historically, these factors have combined to make Osage one of the leading oil and gas producing counties in Oklahoma.

On June 28, 1906, an Act of Congress provided that "the oil, gas, coal, or other minerals covered by the lands for the selection and division of which provision is herein made are hereby reserved to the Osage Tribe for a period of twenty-five years..." It further authorized and directed that a roll of the Osage Tribe be established to record the legal membership thereof. It provided for allotment of all lands belonging to the Osage Nation (with certain exceptions) to the 2,229 Osage tribal members enrolled at that time. It reserved from allotment oil, gas, coal, and other minerals, but directed that the royalties received from mineral production be distributed to the membership of the Osage Tribe in accordance with the legal roll. The Act provided that the lands, moneys, and mineral royalties of deceased Osage Indians should be equally divided among the legal heirs.

On March 3, 1921, Congress passed an Act which reserved mineral interests to the Osage Tribe until April 7, 1946; provided that all valid existing oil and gas leases on April 7, 1931 (25 years after the initial period, beginning April 8, 1906) would be reviewed upon the same terms and extended, subject to all other provisions of the Act of 1906, until the date of April 8, 1946, or as long thereafter as oil or gas is found in paying quantities. An amendment of the Act of 1906 on March 2, 1929 extended the mineral estate reserved to the Osage Indians until April 8, 1958. Another amendment of June 24, 1938 extended the mineral estate reserved to the Osage Indians until April 8, 1983.

On October 21, 1978, Congress again amended the original Act of 1906, but instead of granting another extension of 25 years or less, the latest amendment extended Federal trust supervision over the Osage mineral estate in perpetuity (that is, for an indefinite period, an annuity payable forever). The U.S. Department of the Interior is forever vested with complete supervision and management of the Osage mineral estate. (BIA, 1979)

Program Operational Responsibility and Procedures[1]

The Superintendent of the Osage Agency has the delegated responsibility to manage oil and gas operations on the Osage Reservation. This responsibility includes, but in not limited to: (1) approval of all subsurface mineral mining leases; (2) approval of drilling, workover, and plugging operations for oil and gas wells; (3) maintaining accurate records of all production and income received; (4) appraising damages and collection of compensation for damages on restricted Indian lands; (5) reviewing all incoming well records to ensure that they comply with Agency standards; (6) monitoring overall lease operations to minimize or prevent pollution (surface or subsurface) by lessees; and (7) ensuring that lessees carry out lease operations in a prudent manner. The Superintendent also is responsible for managing all aspects of other mining and mineral operations on the Osage Reservation, which include, but are not limited to: sandstone, gravel, clay, sand, and limestone mining permits. A complete list of the responsibilities of the Superintendent of the Osage Agency is presented in 25 CFR Part 226, Leasing of Osage Reservation Lands for Oil and Gas Mining, and 25 CFR Part 214, Leasing of Osage Reservation Lands for Mining Except Oil and Gas.

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

For a complete discussion of the activities associated with the Osage Agency please see Appendix 1.

3.0 ALTERNATIVES

The BIA, as required by NEPA, must "study, develop, and describe appropriate alternatives to the recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources..." (NEPA Sec 102[2] [e]). Developing a range of alternatives allows for exploration of options designed to meet the purpose and need for the action. Along with the No Action Alternative, the BIA is considering the Proposed Action.

3.1 THE PROPOSED ACTION

In addition to the No Action Alternative, this document analyzes the potential impacts of the Leasing Procedures detailed below. As the leasing action is solely administrative in nature and involves no ground disturbing activities, then no impacts would occur to the following critical elements: land resources, air quality, water resources, wetlands, biological resources, threatened and endangered species, soils, vegetation, cultural resources, public health and safety and environmental justice (EJ). After a lease is granted, no disturbance of any kind can begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place. Applicants must also agree to follow all best management practices (BMPs) and appropriate monitoring mitigations as outlined in the Appendix.

Leasing Procedures – Oil and Gas

A lease can be obtained for oil, gas or for a combination of oil and gas mining. A prospective lessee (any individual person, a firm or a corporation) must nominate a specific tract of land for the type of lease desired. The nominations take place about two months prior to each lease sale. The nominated tracts (generally quarter sections or 160 acres) are put up for auction at publicly advertised sales which take place three times annually. A nominating bid must accompany each tract nomination before the tract is considered for listing at the sale. Each nominating bid is reviewed by the Osage Agency Minerals Branch staff and, if the nominating bid is considered to be an equitable amount, the tract is advertised for sale. An oral auction is conducted at each lease sale and the highest bidder is awarded an oil, gas, or combination oil and gas lease on the tract in question.

After successful bidders are determined for each tract, the bidder must obtain a performance bond and file other necessary papers before the lease is approved. Successful bidders must deposit with the Superintendent on the day of the sale a check or cash in an amount not less than 25 percent of the cash bonus offered as a guaranty of good faith. Bonuses are money offered by prospective bidders to enhance acceptability of their bids. Within 20 days after notification of being a successful bidder, the bidder must submit to the Superintendent the balance of the cash bonus, a $10 filing fee, and the lease in completed form. The Superintendent may grant time extensions for completion and submission of lease forms, but no extension can be granted for remitting the balance of moneys due. If the lease in not completed or the lease is rejected through no fault of the Osage Minerals Council or

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

Superintendent, the 25 percent of the cash bonus bid is forfeited to the Osage Tribe. The Superintendent may reject a lease made on an accepted bid upon evidence satisfactory to him/her of collusion, fraud, or other irregularity in connection with the notice of sale.

The Osage Minerals Council now establishes the term of each lease which is published with each sale notice. A primary term of 2 years is currently used as the normal period. Regardless of the length of the primary term, a lessee must complete a well producing and selling oil and/or gas in paying quantities within 12 months of the date of approval or pay rental, or the lease will terminate.

On many occasions, tracts, which have been leased in the past, but on which few or no producing oil or gas wells (in paying quantities) were brought in, have been leased a second time. Virtually the entire County has been repetitively leased, parts of it more than four or five times. Several large tracts of land are under blanket leases known as concession agreements. These leases are held by larger companies for indefinite periods until production ceases.

Both unitizing (merging) and transferring of leases is permitted under proper conditions. Lease assignments or transfers require the qualification of the new owner, a satisfactory performance bond and approval by the Superintendent.

3.2 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed Leasing Procedures detailed in section 2.5, will not be permitted. No impacts would occur as a result of this project to the following critical elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice (EJ). There would be no project-related ground disturbance, use of hazardous materials, or trucking of product to collection areas. Surface disturbance, deposition of potentially harmful biological material, and traffic levels would not change from present levels. Under the No Action Alternative, the Osage Nation, tribal members, and allottees would not have the opportunity to realize potential financial gains from the discovery and resulting development of resources at these well locations.

In accordance with Section 6.4.4, Alternatives, BIA NEPA Guidebook, "For an EA where there are no unresolved conflicts with respect to alternative uses of available resources only the proposed action needs to be considered (43 CFR 46.310(b)). Therefore, the No Action alternative will not be analyzed throughout this EA. However, the No Action alternative will be considered during subsequent NEPA analysis performed before the issuance of site-specific workover permits that are tiered from this programmatic EA.

3.3 BIA-PREFERRED ALTERNATIVE

The preferred alternative is to complete all administrative actions and approvals necessary to authorize and facilitate oil and gas leasing of the proposed locations.

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

4.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The broad definition of NEPA leads to the consideration of the following elements of the human and natural environments: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and Environmental Justice (EJ).

4.1 LAND RESOURCES[1]

Osage County is within the Central Lowlands physiographic province on the Oklahoma Platform that dips gently to the west. The Oklahoma Platform is a region of mid-continental Paleozoic rocks on the Ozark Uplift. Bedrock formations are typically intermixed with layers of sandstone, shale and thin limestone and outcrops. Oil and gas production are major natural resources in the County. The first well of significance was drilled by Edwin Foster of the Phoenix Oil Company in 1897, near the Eastern boundary of the County. It was drilled to a depth of 1,349 feet into Sand strata now known as the "Bartlesville Sand." Within 6 years, 30 more wells were drilled, and by 1920 the Burbank Field had been discovered. More than 25,000 oil and gas wells, owned by more than 1,000 oil companies, have been drilled in Osage County. Limestone bedrock is quarried near Pawhuska, Burbank, and Hominy. The limestone is crushed into stones for riprap or gravel for concrete and road construction. Agricultural lime is also produced and sand is dredged from the Arkansas River near Ralston and Ponca City.

The bedrock outcrop formation is mainly of the Upper Pennsylvanian and Lower Permian age structures. The proposed well drilling corridor is characterized by gently rolling to rocky hills dissected by lowlands of tributaries to the Arkansas River. The elevation of the well site is approximately 750' above sea level. According to the General Soil Map for Osage County (referenced in the Appendix), the well site is situated within the Steedman-Coweta-Bates Soil Association and more specifically, the Steedman-Coweta complex with 3 to 15 percent slopes.

Osage County is the largest of 77 counties in Oklahoma, encompassing a total of 1,476,480 acres. It is located in the northeastern portion of the State and is border by Kansas on the north, the Arkansas River on the southwest, Tulsa County on the southeast, and Washington County on the east. Pawhuska, the county seat, is centrally located. Although the majority of the study area is sparsely populated, an extension of metropolitan Tulsa has produced an urban area at the far southeastern corner of the county. Except for large flood plains along the Arkansas River and several other major streams, the topography of the county is characterized by gently rolling hills. These hills are generally covered by native grassland and wooded lands and are used primarily for cattle grazing.

PHYSIOGRAPHY AND TOPOGRAPHY[1]

Osage County is situated in the Interior Plains division of the Central Lowlands physiographic province. The northwestern part of the county is in the Northern Limestone Cuesta Plains subdivision while the southeastern portion is in the Eastern Cuesta Plains subdivision. The terrain of the region is characterized by gently rolling to rocky hills dissected by lowlands of

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

the Arkansas River and its major tributaries. As shown in Figure 10, the average elevation in the county is about 860 feet, and ranges from a maximum of 1,407 feet at one point a few miles northeast of Foraker to around 590 feet. Most slopes are in the range of 0 to 15 percent.

Geologic Setting and Mineral Resources[1]

Osage County is situated in a region of mid-continental Paleozoic rocks on the western flank of the Ozark Uplift. Structurally, the entire area is part of a regional homocline which dips gently to the west. Bedrock formations are typically intermixed sequences of sandstone, shale and thin limestones in the eastern two-thirds of the county. For the most part, the entire county is considered to be an outcrop of Upper Pennsylvanian aged structures. However, rocks of Lower Permian age produce outcrops in a few extreme western areas of the county. The rolling hills are virtually all grass covered because of the high calcium content of the soils derived from the parent rocks of high carbonate content.

Oil and gas production in the county comes mainly from formations at depths between 200 and 3,000 feet. The Burbank Sand, Oswego Lime, Arbuckle Sand and Mississippi Chat are among the formations from which oil and gas have been produced. In general, production comes from shallow formations in the eastern portion of the county and from deeper formations to the west. A stratigraphic section typical of the major Burbank field is shown in Figure 11. Shale and limestone quarrying are carried out at some surface outcrops of these rocks. Sand and gravel are recovered from alluvial deposits along the Arkansas River and the major tributary streams.

Osage County is within the Central Lowlands physiographic province on the Oklahoma Platform that dips gently to the west. The Oklahoma Platform is a region of mid-continental Paleozoic rocks on the Ozark Uplift. Bedrock formations are typically intermixed with layers of sandstone, shale and thin limestone and outcrops. Oil and gas production are major natural resources in the County. The first well of significance was drilled by Edwin Foster of the Phoenix Oil Company in 1897, near the Eastern boundary of the County. It was drilled to a depth of 1,349 feet into Sand strata now known as the "Bartlesville Sand." Within 6 years, 30 more wells were drilled, and by 1920 the Burbank Field had been discovered. More than 25,000 oil and gas wells, owned by more than 1,000 oil companies, have been drilled in Osage County. Limestone bedrock is quarried near Pawhuska, Burbank, and Hominy. The limestone is crushed into stones for riprap or gravel for concrete and road construction. Agricultural lime is also produced and sand is dredged from the Arkansas River near Ralston and Ponca City. The bedrock outcrop formation is mainly of the Upper Pennsylvanian and Lower Permian age structures. The proposed well drilling corridor is characterized by gently rolling to rocky hills dissected by lowlands of tributaries to the Arkansas River.

The Proposed Action would not impact land resources within the county as no ground disturbing activities are required. The leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

4.2 AIR QUALITY

Air Quality Standards and Criteria Pollutants

The Clean Air Act (CAA) of 1970 requires that states adopt ambient air quality standards. The CAA (42 USC 7401 et seq.) establishes ambient air quality standards, permit requirements for both stationary and mobile sources, and standards for acid deposition and stratospheric ozone (O_3) protection. The standards have been established in order to protect the public from potentially harmful amounts of pollutants. Under the CAA, the U.S. Environmental Protection Agency (USEPA) establishes primary and secondary air quality standards. Primary air quality standards protect public health, including the health of "sensitive populations, such as people with asthma, children, and other adults." Secondary air quality standards protect public welfare by promoting ecosystem health, and preventing decreased visibility and damage to crops and buildings.

USEPA has set National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: O_3, particulate matter ($PM_{2.5}$, PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead (Pb). Greenhouse gasses (GHG), water vapor, carbon dioxide, methane, nitrous oxide, and O_3 are also regulated and have been linked to global climate change.

Criteria pollutants and their health effects include the following.

- **SO_2:** SO_2 is a colorless gas with a strong, suffocating odor. SO_2 is produced by burning coal, fuel oil, and diesel fuel, and can trigger constriction of the airways, causing particular difficulties for asthmatics. Long-term exposure is associated with increased risk of mortality from respiratory or cardiovascular disease. SO_2 emissions are also a primary cause of acid rain and plant damage (EPA 2012a).

- **Inhalable PM (PM_{10} and $PM_{2.5}$)**: PM_{10} and $PM_{2.5}$ are classes of compounds that can lodge deep in the lungs, causing adverse health problems, depending on their size, concentration, and content. Based on extensive health studies, particulate matter is regulated under two classes. PM_{10} is the fraction of total particulate matter 10 microns or smaller, and $PM_{2.5}$ is two and a half microns or smaller. Inhalable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter (EPA 2012a).

- **NO_2**: NO_2 is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months, NO_2 is a major component of photochemical smog. NO_2 is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. NO_2 is also involved in ozone smog production (EPA 2012a).

- **O_3:** O_3 is a colorless gas with a pungent, irritating odor and creates a widespread air quality problem in most of the world's industrialized areas. Ozone smog is not emitted directly into the atmosphere but is primarily formed through the reaction of hydrocarbons and nitrogen oxides in the presence of sunlight. Health effects related to

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O_3 can include reduced lung function, aggravated respiratory illness, and irritated eyes, nose, and throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. O_3 can persist for many days after formation and travel several hundred miles (EPA 2012a).

- **CO:** CO is a colorless, odorless gas that is a byproduct of incomplete combustion. CO concentrations typically peak nearest a source, such as roadways or areas with high fireplace use, and decrease rapidly as distance from the source increases. Ambient levels are typically found during periods of stagnant weather, such as on still winter evenings with a strong temperature inversion. CO is readily absorbed into the body from the air. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure are headaches, fatigue, slow reflexes, and dizziness (EPA 2012a).

According to the USEPA, no counties in Oklahoma are classified as nonattainment areas for criteria pollutants (USEPA 2011). No air quality monitoring stations in Osage County were identified (ODEQ 2012). Southerly winds prevail for most of the year in the area with the exception of winter when northerly winds are associated with weather events (OCS 2012). Osage County, given its rural nature, maintains good air quality and visibility throughout the year.

Refer to Appendix 2 for a more thorough summary of typical air emissions related to oil field development, greenhouse gas emissions, climate change, and hazardous air pollutants. An extensive list of best management practices can also be found in the Air Quality section of Appendix 2.

The Proposed Action would not impact air quality within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.3 WATER RESOURCES[1]

This section identifies the existing water resources within the project area and potential effects of the Proposed Action. Specific subjects discussed in this section include surface water and surface water quality, groundwater resources, and the potential short-term and long-term impacts of the Proposed Action on these water resources. The act of leasing a parcel of land would have no impacts to water resources, however subsequent activities associated with the drilling and completion of an oil or gas well may produce impacts. Surface disturbance from the construction of well pads, access roads, pipelines, and utility lines can result in degradation of surface water and groundwater quality from non-point source pollution, increased soil losses, and increased gully erosion.

Ground Water

The major groundwater basin in Osage County is the Vamoosa Aquifer which measures approximately four to nine miles across Osage County. It is composed of inter-bedded

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

sandstone, shale and conglomerate. The formation ranges from about 300 to more than 630 feet thick. The large amount of shale in northern portions of the Vamoosa limits well yields to about 60 gallons per minute. Alluvium quaternary deposits (stream-laid deposits of inter-fingering sand, silt and clay) are the most productive deposits and occur within a one to six mile stretch along the Arkansas River. Water quality in this portion of the Arkansas River is classified as hard to very hard, with dissolved solids content in excess of 500 mg/L in some places.

In reference to water rights, it is well established in Oklahoma that holders of mineral rights are entitled to use groundwater necessary to produce minerals and water rights remain with the surface owner. Brine infiltration from water flood injection used in oil recovery has contaminated the water-bearing strata and is a water quality problem in Osage County. Approximately six industrial facilities and nine municipalities are permitted by the U.S. Environmental Protection Agency, Region VI (EPA) to discharge treated wastewater into various streams, creeks and lakes in Osage County. Of these permitted facilities, two are located on Indian land with business leases approved by the BIA.

Surface Water

Osage County is located within the Arkansas River Drainage Basin and streams drain directly into the Arkansas River and Caney River, a main tributary of the Arkansas River. Area lakes were identified as Bluestem, Shidler, Skiatook, Hulah, Kaw, Keystone, Candy, and Birch. The lakes provide adequate water storage for public drinking water supplies to nearby towns and rural water systems.

The average annual precipitation for Osage County ranges from 32 to 38 inches. Moderate rainfall and hilly topography allow for intermittent stream flows in Osage County. Receiving water bodies for stormwater runoff include Wildhorse Creek and Skiatook Lake which border the project area to the west and north, respectively. Vegetation found along these riparian areas serve as a natural buffer zone that protects water quality from increased siltation caused by soil erosion, washouts, weathering and wildfires.

In addition to area lakes, farm ponds, watershed projects, streams and creeks are the main water-supply for wildlife and livestock. There is one water quality monitoring station in Osage County which is located in Bird Creek near Avant. At this station, sulfate, chloride, solids/residue, hardness, sodium, specific conductance, and pH are monitored by the U.S. Geological Survey.

The surface water resources in the project area would be managed and protected according to existing federal laws and policies regarding the use, storage, and disposal of the resource during the construction and operation of the project. Surface water resource use and protection is administered under the following federal laws:

- Clean Water Act of 1972, as amended (33 USC 1251 et seq.)
- Federal Land Policy and Management Act of 1976 (43 USC 1711–1712)
- National Environmental Policy Act of 1972 (42 USC 4321)
- Safe Drinking Water Act of 1974, as amended (42 USC 300 et seq.)

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Regulations under the CWA govern any discharge of pollutants into waters of the U.S. and set in stream standards for water quality.

Under the CWA, it is unlawful to discharge any pollutant from a point source into any navigable waters of the U.S., unless a permit has first been obtained through the National Pollution Discharge Elimination System program. In Osage County, the U.S. Environmental Protection Agency Region 6 (Dallas) office is responsible for issuance of NPDES permits related to oil and gas development activities.

The Proposed Action would not impact water resources within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.4 SOILS[1]

A complete and detailed soil survey of Osage County has been completed by the U.S. Department of Agriculture, Natural Resources Conservation Service in 2012. Four major soil groupings exist in Osage County, which incorporate 70 individual soils as determined from this survey. The twelve soil associations can be categorized into three major groups. One group, the Verdigris-Mason-Wynona and Kiomatia-Mason-Roebuck Associations are comprised of soils which are deep, loamy sands found primarily on wooded floodplains. These two associations cover 14 percent of Osage County, and are used mainly for field crops and tame pastures. Uncleared areas of these soils support bottomland hardwoods with an understory of native tall grasses.

The second group is comprised of seven soil associations which cover about 50 percent of the county supporting the prairie-covered uplands. These seven associations are the Dennis-Parsons-Bates, Steedman-Coweta-Bates, Apperson-Wolco-Dwight, Shidler-Summit-Foraker, Grainola-Shidler-Stoneburg, Corbin-Pawhuska, and Norge-Vanoss. The soils in these associations are used mainly for native range, native hay meadows and tame pasture. Native vegetation consists mostly of tall grasses. Soils that are free of stones and on level to gently sloping topography are suitable for cultivation. In some areas containing these soils, limestone is quarried.

The remaining group of three associations is comprised of the following: Niotaze-Darnell, Dougherty-Eufaula, and Darnell-Stephenville Associations. This group covers about 34 percent of the county. The soils are shallow to deep, loamy or sandy, and are found on wooded uplands. Some of the deeper soils are cultivated to small grains, cotton, or grain sorghum. Native vegetation is mostly postoak, blackjack oak, and hickory, with an understory of native tall grasses.

Generally, the soils in Osage County are a constraint to both mechanized agricultural production and urban and industrial development. Soil erosion is a major problem for cropland or other exposed surfaces on slopes greater than 2 percent. Most soils present moderate to severe limitations to recreational use, shallow excavations, basement construction, road bases, septic tank fields, sewage lagoons and sanitary landfills.

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

Consequently, over 70 percent of the county remains in native grassland or partially wooded rangeland.

In the southeastern part of the county most of the soils are loamy and are moderately deep or shallow over sandstone. In the northeastern and western part of the county the soils are loamy and are dominantly moderately deep, with some shallow and deep soils over shale, and shale interbedded with sandstone. In the north-central, central, and south-central part of the county the soils are loamy and are moderately deep, with some shallow and deep soils over sandstone and sandstone interbedded with shale (USDA NRCS 2012a).

The Proposed Action would not impact soils within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.5 WETLANDS

The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into waters of the U.S., including wetlands, pursuant to Section 404 of the Clean Water Act. Additionally, Executive Order 11990 (protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands.

The Proposed Action would not impact wetlands within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.6 PRIME FARMLAND

The Farmland Protection Policy Act (FPPA) states that federal agencies must "minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses…" The NRCS is responsible for protecting significant agricultural lands from irreversible conversions that result in the loss of an essential food or environmental resource. Prime farmland is characterized as land with the best physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops. This land either is used for food or fiber crops or is available for those crops, and not urban, built-up land, or a water area. The soil qualities, growing season, and moisture supply are those needed for a well-managed soil to economically produce a sustained, high yield of crops (USDA NRCS 2012).

Since most leasing operations do not lead to the permanent conversion of prime farmland then, this impact will be analyzed on a project specific basis during subsequent NEPA reviews. Direct impacts resulting from the construction of well pads, access roads, and reserve pits can affect the soil properties, increase erosion, and reduce water infiltration potentially affecting the characteristics unique to prime or unique farmlands.

The Proposed Action would not impact prime farmland within the county as no ground disturbing activities are required. The leasing action is solely an administrative process and

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.7 VEGETATION AND NOXIOUS WEEDS

Vegetation Data

According to the Oklahoma Biological Survey, Osage County includes three major vegetation types: post oak-blackjack forest, tallgrass prairie, and bottomland forest along the Arkansas River. Vegetation types are influenced by precipitation, geology and soils, and fire and grazing disturbances. Post oak-blackjack forest, also known as cross timers, is characterized by a mix of forest, woodland, and grassland vegetation. Post oak, blackjack, blackhaw, black oak, black hickory, buckbrush, gum bumelia, Mexican plum, redbud, roughleaf dogwood, and smooth and winged sumac are common woody species. The herbaceous layer contains beebalm; beg bluestem, poverty grass, among others. The tallgrass prairies contain primarily grasses such as little bluestem, big bluestem, Indiangrass and switchgrass. Other herbaceous plants found in the tallgrass prairie are lead plant, Indian plantain, prairie clover, and many others. Tallgrass prairie is commonly replaced by forests and woodlands in the absence of fire or grazing pressure and has declined in acreage during recently years. There is tremendous variation in species composition of bottomland forests, but most are dominated by hackberry, red elm, sugarberry, and green ash. (Hoagland 2008)

Noxious Weeds

"Noxious weeds" is a general term used to describe plant species that are not native to a given area, spread rapidly, and have adverse ecological and economic impacts. These species may have high reproduction rates and are usually adapted to occupy a diverse range of habitats otherwise occupied by native species. These species may subsequently out-compete native plant species for resources, causing a reduction in native plant populations.

The Proposed Action would not impact vegetation within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.8 WILDLIFE

4.8.1 General Wildlife Species Occurrence and Habitat

General Wildlife Species Occurrence and Habitat

In Osage County, migratory waterfowl such as ducks, herons, shore birds, and geese are known to frequent areas around rivers, streams, ponds, wetlands and lakes. Additionally, wildlife attracted to these areas includes muskrat, mink and beaver. Upland game birds such as bobwhite quail, meadowlark, field sparrow, and doves are plentiful and can be found in agricultural and prairie lands. Other species could include white-tailed deer, wild turkey, bobcats, coyotes, fox, jackrabbit, raccoon, squirrels, skunks, opossums, and armadillos, which are predominate throughout the County. Many ponds and lakes have been stocked with game fish, principally bass, crappie, perch and catfish. Catfish and bass can also be found in the larger streams.

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

The Proposed Action would not impact wildlife within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.8.2 Threatened and Endangered Species

Section 7 of the Endangered Species Act (16USC 1531 et seq.) requires that federal agencies, in consultation with the USFWS, ensure that their actions are not likely to jeopardize the continued existence of any listed species, or result in adverse effects on designated critical habitat of such species. The Endangered Species Act also prohibits any action that results in a "taking" of any listed federally protected plant, fish or wildlife species. The Applicant and the BIA must ensure that the proposed action does not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the adverse modification of a federally designated critical habitat of a listed species. Compliance with Section 7 of the ESA will be determined on a project specific basis during subsequent NEPA analysis to be completed before implementation of any subsequent oil field development or productions activities that may occur as a result of leasing actions covered under this EA.

The Proposed Action would not impact threatened and endangered species within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.8.3 Migratory Birds

The Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 40 Stat. 755 as amended) protects migratory birds and most resident birds that are native to the United States. According to the MBTA, it is illegal to pursue; hunt; take; capture; kill; attempt to take capture, or kill; and active nests (and the eggs or young within). The MBTA does not prohibit harassment, disturbance, or habitat removal and alternations. Thus, MBTA prohibitions most relevant to the proposed action involve killing of a chick or egg through destruction of an active nest.

The Proposed Action would not impact migratory birds within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.8.4 Agriculture

Ranching is the main enterprise in Osage County. According to the 2007 Agricultural Census, livestock sales accounted for $127 million, or 96 percent, of the total agricultural market. Osage County ranks 9th out of the 77 counties in Oklahoma in total value of agricultural products sold (USDA NASS 2007a). The average operating ranch unit is approximately 83.5 acres. About 75 percent of the land in farms or ranches is open range, 12

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

percent is wooded range, 7 percent is cropland, and 6 percent is tame pasture. Small grains, mainly wheat, alfalfa, grain sorghums, and soybeans are the principal crops. Corn and sorghums cut for silage and used by local dairies, and orchard crops are grown on a minor acreage. A large acreage of native grasses and tame pastures are cut for hay which is mostly used by local farms and ranchers. The other crops are shipped to local and distant markets and sold for cash. Approximately 75 percent of the annual production on rangeland grows in April, May, and June coinciding with spring rains and moderate temperatures. A secondary growth period generally occurs in September and October coinciding with fall rains and cooling temperatures (USDA NRCS 2012a).

The Proposed Action would not impact agriculture within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.9 CULTURAL RESOURCES

Brief Cultural Overview

Based on previous archaeological work within Oklahoma, portions of the state have been inhabited by humans for at least 12,000 years. Throughout most of the state, the recorded prehistoric occupations range from Paleoindian Period encampments to Late Prehistoric Period sites. Some areas within the region hold a long history of Native American habitation. Multiple sites have been explored that suggest the area was inhabited by societies adapted for various geographical regions of the area dating back to 6000 B.C.

Historic Period sites vary widely across Oklahoma. Structures and buildings associated with pre-removal and post-removal historic Native American tribes, non-Indian settlements of the Oklahoma Territory beginning in 1889, farming, and the late nineteenth/early twentieth century petroleum industry are commonly encountered.

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations, and agreements. Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.) requires, for any federal, federally assisted, or federally licensed undertaking, that the federal agency take into account the effect of that undertaking on any district, site, building, structure, or object that is included in the National Register of Historic Places (National Register) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural, and religious significance. Eligibility criteria (36 CFR 60.4) include association with important events or people in our history, distinctive construction or artistic characteristics, and either a record of yielding or a potential to yield information important in prehistory or history. In practice, properties are generally not eligible for inclusion in the National Register if they lack diagnostic artifacts, subsurface remains, or structural features, but those considered eligible are treated as though they were listed in the National Register, even when no formal nomination has been filed. This process of taking into

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

account an undertaking's effect on historic properties is known as "Section 106 review," or more commonly as a cultural resource inventory.

The area of potential effect of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the American Indian Religious Freedom Act of 1978 (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

Whatever the nature of the cultural resource addressed by a particular statute or tradition, implementing procedures invariably include consultation requirements at various stages of a federal undertaking (Executive Order 13175). The Osage Nation has designated a Tribal Historic Preservation Officer (THPO), whose office and functions are certified by the National Park Service. The BIA consults and corresponds with the THPO regarding cultural resources on all projects proposed within Osage County. Compliance with Section 106 of the NHPA will be determined on a project specific basis during subsequent NEPA analysis to be completed before implementation of any subsequent oil field development or productions activities that may occur as a result of leasing actions covered under this EA.

The Proposed Action would not impact cultural resources within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

4.10 SOCIOECONOMICS

This section discusses socioeconomic characteristics such as population, housing, demographics, employment, and economic trends within the analysis area. Also included are data relating to the State of Oklahoma and the United States, which provide a comparative discussion when compared to the analysis area. Information in this section was obtained from various sources including, but not limited to, the U.S. Census Bureau, the U.S. Bureau of Economics, and the State of Oklahoma.

Population and Demographic Trends

According to the U.S. Census Bureau, the 2010 population estimate for Oklahoma was approximately 3.75 million, as shown in Table 14-24 below. Between the years 2000 and 2010, the state population grew by 8.7 percent. The population of Osage County grew at a similar rate to the state.

Table 14-24 Population Change in Osage County, Oklahoma

Region	Population	Percent Change

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

	2000	2010	2000-2010
Oklahoma	3,450,654	3,751.351	8.71
Osage County	44,437	47,472	6.83

Source: USCB, 2000 and 2010 Population Estimates

Table 14-2.a presents the racial composition of Oklahoma and Osage County. The dominant race in Oklahoma and Osage County is white, comprising 65 percent of the population in Osage County. The next most represented race in Osage County is American Indian/Alaska Native, comprising 14 percent of the population in Osage County.

Table 14-24.a 2010 Census Population by Race in Osage County, Oklahoma

Category	Osage County		Oklahoma	
	Population	%	Population	%
Hispanic/Latino	1,366	2.88	332,007	8.85
White	30,709	64.69	2,575,381	68.65
Black or African American	5,355	11.28	272,071	7.25
American Indian/Alaska Native	6,704	14.12	308,733	8.23
Asian	118	0.25	64,154	1.71
Native Hawaiian and Other Pacific Islander	11	0.02	3,977	0.11
Some Other Race	14	0.03	2,954	0.08
Two or More Races	3,195	6.73	192,074	5.12
Total Population	47,472		3,751,351	

Source: USCB, 2010 Census

Table 14-24.b presents the population in the workforce in Osage County. Approximately 78% of the Oklahoma population is 16 years old, or older, and part of the workforce. Osage County follows the same trend with 78 percent in the workforce.

Table 14-24.b 2010 Census Population in the Workforce in Osage County, Oklahoma

Region	16 and Over	
	Population	Percent
Oklahoma	2,924,289	77.95
Osage County	37,292	78.56

Source: USCB, 2010 Census

Total non-farm employment in Oklahoma increased by approximately 22,800 jobs in 2011. The largest non-farm related employer industry in Oklahoma is the government, which

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

includes jobs in public schools, law enforcement, and tribal government, followed in number of non-farm jobs by trade, transportation, and utilities jobs. In 2011 the mining and logging industry experienced a growth of 15 percent, the greatest of all industries within Oklahoma. Other industries that grew in 2011 includes manufacturing; trade, transportation and utilities; education/health services, leisure/hospitality; and government. Industries that saw a decline in employment in 2011 include construction, information, financial activities, profession/business services, and other services (OESC 2012).

The 2010 median household income for Oklahoma was $42,979. Median household income was slightly lower than the state average in Osage County (USCB 2010).

4.10.1 Potential Impacts to Socioeconomics

Impacts to socioeconomic resources of the analysis area would be incremental and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would generally occur during the period leasing actions.

Implementation of the Proposed Action would likely result in direct and indirect economic benefits associated with industrial and commercial activities. Cumulative impacts and reasonably foreseeable future development activities of the Osage Minerals Reserve may lead to direct impacts which would include increased spending by contractors and workers for materials, supplies, food, and lodging in the surrounding area, which would be subject to sales and lodging taxes. Other state and local tax payments and fees would be incurred with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those who were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

4.11 PUBLIC HEALTH AND SAFETY

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The Osage County Sheriff's department as well as several local agencies provides law enforcement services. In addition, the Osage Nation Police Department (ONPD) is charged with enforcing all tribal, state, and federal laws on the Osage Nation Reservation. The ONPD is directed by a Chief of Police who is responsible for the day to day operations of the police department (Osage Nation 2012). Fire and emergency response is the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, and Wynona. The Osage Nation Emergency Management Agency provides fire protection for the restricted and trust land on the Osage Reservation.

The Proposed Action would not impact public health and safety within the county as no ground disturbing activities are required as the leasing action is solely an administrative process and subsequent NEPA analysis and permit approval would be required for future oil field development and production activities that may occur as a result of the leasing action.

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

4.12 ENVIRONMENTAL JUSTICE

Executive Order 12898 directs federal agencies to develop strategies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

Table 3-15 presents a summary of information for Osage County as reported from the 2010 Census. Within Oklahoma, 16.2 percent of the population is below the poverty level. Osage County has a lower percentage than the state at 12.6 percent. The American Indian and Alaskan Native population comprises 8.6 percent in Oklahoma, while Osage County has a higher population of American Indian and Alaskan Native person than the state overall.

Table 3-15 Minority Populations in Osage County, Oklahoma

Category	Osage County %	Oklahoma %
Black persons	11.4	7.4
American Indian and Alaskan Native persons	14.4	8.6
Asian persons	0.3	1.7
Hispanic/Latino persons	2.9	8.9
Multi-racial persons	7.1	5.9

Source: USCB, 2010 Census

Table 3-16 presents the disability status of civilian, non-institutionalized population within Osage County. The percent of the Oklahoma population 5 years and over with a disability is 21.6 percent. Osage County has a slightly higher disability rate than the state. Overall, within the three age groups, the population 65 years and over has the highest rate of disability (USCB 2000b).

Table 3-16 Disability Status of Civilian, Non-Institutionalized Populations in Osage County, Oklahoma

Category	Osage County		Oklahoma	
	Number	%	Number	%
Population 5 to 20 years	10,600		809,597	
With a disability	870	8.2	70,153	8.7
Population 21 to 64 years	24,040		1,885,835	
With a disability	5,518	23.0	405,333	21.5
Population 65 years and over	5,582		429,566	

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

With a disability	2,658	47.6	200,612	46.7

Source: USCB, Census 2000 Summary File 3

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, signed in 1994 by President Clinton, requires that federal agencies advance EJ by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions, or operations. Meaningful involvement means federal officials actively promote opportunities for public participation and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Executive Order and is responsible for related legal action. Working criteria for designation of targeted populations are provided in *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998)*. This guidance uses a statistical approach to consider various geographic areas and scales of analysis to define a particular population's status under the Executive Order.

Potential Impacts to Environmental Justice

Environmental justice communities are present within Osage County. In fact, minority populations are increasing in the analysis area compared with statewide numbers, which could result in disproportionately beneficial impacts from the proposed oilfield development that would be supported by the installation of the proposed well pad. These would derive from direct and indirect economic opportunities for tribal members. Generally, existing oil and gas leasing has already benefited the Osage Nation government and infrastructure from tribal leasing, fees, and taxes. Current oil and gas leasing within the Osage Minerals Reserve has also already generated revenue to Osage head right shareholders who receive royalty payments from the Minerals Estate. However, owners of allotted surface within the analysis area may not necessarily hold mineral rights. In such cases, surface owners do not receive oil and gas lease or royalty income, and their only related income would be compensation for productive acreage lost to road and well pad construction. Those with mineral interests also may benefit from royalties on commercial production if the wells prove successful. Profitable production rates at proposed locations might lead to exploration and development of additional tracts owned by currently non-benefitting allottees. In addition to increased revenue for land and mineral holders, exploration and development would increase employment in the RMP planning area, which would help alleviate some of the poverty prevalent in Osage County. Tribal members without either surface or mineral rights would not receive any direct benefits, except through potential employment, should they be hired. Indirect benefits of employment and general tribal gains would be the only potential offsets to negative impacts.

Potential adverse impacts could occur to tribes and tribal members from the potential disturbance of any traditional cultural properties and cultural resources. These potential impacts are reduced through surveys of proposed well locations, and access road and gathering pipeline routes; mitigation measures required by the BIA; and thorough reviews and determinations by the BIA that there would be no effect to historic properties. The possibility

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

of disproportionate impacts to tribes or tribal members is further reduced by the requirement for immediate work stoppage following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

Future development actions within the RMP planning area should not result in significant impacts to any other critical element, including air quality, public health and safety, transportation, water quality, wetlands, wildlife, soils, or vegetation, if the described BMPs, design features and mitigation measures are successfully completed. Through the avoidance of such impacts, no disproportionate impact is expected to low-income or minority populations. Future activities will offer many positive consequences for tribal members, while recognizing EJ concerns.

4.13 LIFESTYLES AND CULTURAL VALUES

Oklahomans are proud of their diverse cultures, scenic landscapes, and hospitality. Oklahoma has a history of rich American Indian culture and currently, Oklahoma is home to more than 67 tribes. Additionally, Oklahoma has a long standing tradition of rodeos and is home to horse and cattle ranches with working cowboys. Over 100 traditional and Indian rodeos occur through the year in Oklahoma (Shop Oklahoma 2012).

The Osage Nation is headquartered in Pawhuska, Oklahoma and has approximately 14,500 members nationwide. The Cultural Center, located in Pawhuska, was established in 2004 to maintain the ancestral traditions, values, and way of life of the Osage Nation. To maintain the values of their ancestors and their unique identity, the Osage Nation preserves the lessons of their ancestors. The Cultural Center hosts classes on traditional Osage language; traditional craft-wear, hosts artwork exhibits, and is home to a library (Osage Nation 2012 and Shop Oklahoma 2012).

4.14 INFRASTRUCTURE

Osage County is generally rural with small farming communities and rural residences are scattered throughout; there is limited infrastructure development. There is very little urban development in the County with the exception of the southeast corner which borders the city limits of Tulsa. Communities within the planning area are served by multiple municipal services including police, fire, water, power and other utilities.

4.15 RESOURCE USE PATTERNS

Hunting, Fishing and Gathering

Oklahoma provides a diverse hunting experience with over 12 different ecological regions. The Oklahoma Department of Wildlife Conservation (ODWC) provides habitat conservation and management efforts across the state at designated Wildlife Management Areas (WMAs). Game species in the state include: antelope, bear, dove, deer, elk, furbearers, feral hogs, mountain lion, quail, peregrine, pheasant, turkey, waterfowl, and various other small game

[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

and migratory birds. Hunting seasons vary for the various species, but in general hunting occurs in the fall and winter, October through December.

Additionally, the ODWC manages and stocks lakes and ponds through the state. Fish species produced and stocked annually include largemouth bass, smallmouth bass hybrid, walleye, brown trout and rainbow trout. Annual fish stockings average 11 million fish.

Within Osage County there are 6 designated WMAs that provide opportunities for hunting, fishing and camping. Some of the WMAs include U.S. Army Corps of Engineers (USACE) operated and controlled reservoirs while the park and/or WMA is operated by the ODWC. The USACE creates reservoirs for flood control, water supply, irrigation, hydropower, navigation, recreation, and fish and wildlife (ODWC 2012c). The WMAs in the planning area include: Hula, Osage, John Dahl, Candy Creek, Keystone, and Skiatook.

Timber Harvesting

Osage County is located within the Cross Timbers ecological region (USEPA 2012a). The hardwood community consists primarily of short oak trees that are not prime timber for harvest. However, forested areas have been cleared to create open sections for rangeland, pastures, and farmland.

Recreation

Osage Hills State Park offers 1,100 acres with picnic tables and shelters, RV campsites, cabins, a swimming pool, hiking trails, a ball field, and a tennis court. Fishing for bass, crappie, catfish and perch is common in Lookout Lake or in Sand Creek at the south end of the park. The park is also used for fall foliage viewing (OHSP 2012).

Walnut Creek State Park is located on Lake Keystone and offers fishing, boating, camping, swimming, and water skiing. The 15-mile Sand Plum Trail that features flat to rolling terrain with many vistas of the lake is open to hikers, mountain bikers and horses (OTRD 2012).

Keystone State Park is located on Keystone Lake and offers boating, ATV trails, water skiing, and fishing (OTRD 2012).

Land Use Plans

The Osage County Assessor's Office provided information on the number of acres in each of the major land assessment categories. The data shows that almost 95 percent of Osage County is categorized as rural agricultural with rural residential comprising 2.6 percent of the county.

Noise and Light

The Noise Control Act (42 USC 4901-4918) initially was implemented through regulations issues by the USEPA in the early 1980s; however, the primary responsibility for regulating noise has been delegated to state and local governments.

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

Noise in generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds audible to the human ear. The Day-Night Average Sound Level (DNL) is an average measure of sound.

The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. USEPA guidelines, and those of many other federal agencies, state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools or hospitals.

Osage County is comprised of mostly rural land with occasional residences located throughout. Because of the rural character of the planning area, noise control ordinances are most likely not in place. Excessive artificial lighting is not a current concern for Osage County because of the rural character of the land. No lighting ordinances are in place for the county.

Visual

The visual character of the planning area is a function of the terrain, land cover, and land use. Osage County is generally rural with small farming communities and rural residences are scattered throughout. The planning area is dominated by agricultural fields, woodlands, and pastures/grasslands. Highways, local roads, and railroads, multiple transmission lines, distribution lines, and other types of development occur, contributing to the overall visual character of the area. No designated scenic rivers or areas occur within the RMP planning area (National Wildlife and Scenic Rivers System 2012).

4.16 MITIGATION AND MONITORING

Many protective measures and procedures are described in the Appendix of this EA and would be incorporated, as appropriate, into subsequent permits, leases and their associated NEPA documents. Monitoring of cultural resource impacts by qualified personnel is recommended on a case by case basis for all ground-disturbing activities. When appropriate each phase of implementation would be monitored by the BIA and representatives of the Osage Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report would be developed by the BIA and the responsible lessee or applicant, that documents the results of monitoring in order to adapt the projects to eliminate any adverse impact on the environment.

Mitigation opportunities can be found in general and operator-committed BMPs and mitigation measures. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. The permit applicant will be required to implement, to the extent possible, BMPs in an effort to mitigate environmental concerns in the planning phase, thereby allowing for smoother analysis, and possibly faster project approval. Many of these are required by the BIA when drilling federal or tribal leaseholds and can be found in the surface use plan in the APD. The regulatory agencies provide Conditions of Approval and enforcement would occur as a result of non-compliance which adds incentives for strict adherence to the BMPs.

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[1] Information taken from Bureau of Indian Affairs Programmatic Environmental Assessment (1979).

Reference to the Appendix for a comprehensive list of best management practices available to mitigate any negative impacts associated with oil field development and production activities that may occur as a result of the proposed leasing actions.

4.17 CUMULATIVE IMPACTS

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. Past and current disturbances within Osage County include farming, grazing, roads, and other oil and gas wells. Farming and grazing activities occur in Osage County regardless of the density of oil and gas development, since undivided interests in the land surface, range permits, and agricultural leases are often held by different surface owners than those holding mineral rights, such that economic benefits of both agricultural and oil and gas activities currently co-exist.

Reasonably foreseeable impacts of future developments in Osage County must also be considered. Should further development of leased lands occur and prove productive, it is likely that lessees would pursue additional development in the County. For purposes of cumulative impact analyses, the density of active and permitted oil wells and associated facilities (including access and utility corridors) is expected to increase steadily within the County over the next decade. Oil and gas development is expected to have a minor cumulative effect on land use patterns and the human and natural environment, due to the dispersed and passive nature of the development.

Refer to the Appendix for a more thorough analysis of cumulative impacts anticipated to occur within Osage County if leased lands are further developed.

5.0 CONSULTATION AND COORDINATION

The BIA must continue to make efforts to solicit the opinions and concerns of all stakeholders. For the purpose of this EA, a stakeholder is considered any agency, municipality, or individual person to which the Proposed Action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. A scoping letter declaring the purpose of this Programmatic EA was sent to the Osage Nation Minerals Council and asking for input into the development of the document. In accordance with section 6.6, Public Review, of the BIA NEPA Guidebook, other stakeholders will have the opportunity to comment on the document during the 30-day public review period once the EA has been finalized and Notice of Availability posted. The comments and suggestions received from stakeholders are shown in Table 5-1.

6.0 LIST OF PREPARERS

An interdisciplinary team contributed to this document according to guidance provided in Part 1502.6 of Council on Environmental Quality regulations. This document was drafted by the BIA Osage Agency.

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APPENDIX 1

Program Operational Responsibility and Procedures[1]

Geophysical Exploration

Although fields of major drilling activity and production are fairly well known in Osage County, some areas are relatively less explored. Likewise, some geological strata and formations have received more attention than others. The Superintendent oversees and approves oil and gas geophysical and geological exploration.

Geophysical exploration permits are issued infrequently, but in most cases existing county and lessees' access roads are used, but in some instances equipment is transported over pastures or wooded lands without constructing roads, weather conditions permitting. If required, shot holes are drilled for seismic surveys. A commencement fee of $25 per acre must be paid to the surface owner. After surveys are completed, shot holes are filled and each area is leveled and returned to as near original condition as feasible as soon as all work is done. Damages are paid to the surface landowner for all geophysical work conducted on his property.

Leasing Procedures – Other (Sand, Gravel Rock)

Permits are processed through the Branch of Minerals at the Osage Agency and are subject to 25 CFR Part 214. The review and/or approval of the permit application may take up to 60-90 days to complete as the Osage Agency, working in coordination with the Applicant, must demonstrate full compliance with the National Environmental Policy Act, the National Historic Preservation Act and the Endangered Species Act. The circumstances of each permit may vary and this time period may be greatly reduced depending on the situation. Renewal of an existing mining permit may be completed in 15-30 days.

A list of procedures for obtaining sandy soil and rock mining permits is available at the Osage Agency upon request, but generally include the following steps: (1) letter to the Superintendent, (2) completion of the original permit forms, (3) acquisition of a surety bond or escrow, (4) payment of an annual minimum advance royalty payment, (5) once approved the permit requires the Lessee to complete monthly production reports during the entire term of the permit, even during periods of no production. The monthly reports and royalty owed are due by the 25th of the month following the month of production.

Drilling Activity

A lessee must submit to the Osage Agency a permit application to drill each well. Upon approval, the Superintendent issues the lessee a drilling permit. Prior to filing an application to drill, the lessee must contact the surface owner and discuss the route of ingress and egress to the proposed well site. The only activities which may take place prior to the meeting of the lessee and surface owner are surveying and staking of well sites. At the meeting, in addition to discussing the route of ingress and egress, the lessee must give the surface owner the name and

address of the representative upon whom the surface owner must serve any claim for damage which he may sustain from mineral operations. If the drilling is to be on restricted Indian land, the meeting takes place with the Indian surface owner and the BIA. The Superintendent furnishes such services as may be necessary to handle damage claims on restricted Indian lands.

Lessees or their authorized representatives have the right to use as much of the surface of the land within the Osage Mineral Estate as may be reasonable for operations and marketing, and the right-of-way for ingress and egress to any point of operations. If lessees and surface owners cannot agree on the routing of the items mentioned above, the route is established by the Superintendent. Before commencing a drilling operation, lessees must pay to surface owners commencement money in the amount of $300 for each well, after which lessees are entitled to immediate possession of the drilling sites. Regulations state that a "drilling site shall be held to a minimum area essential for operations and shall not exceed one and one-half acres in area unless authorized by the Superintendent." Acceptance of commencement money on the part of a surface owner in no way affects his future right to damage compensation occasioned by the drilling and completion of the well for which it is paid.

Lessees may not drill wells within 300 feet of the boundary line of a leased parcel of land, nor may they locate a well or tank within 200 feet of any public highway, established watering place, or building used as a dwelling, granary or barn, except with the written permission of the Superintendent. No limits on well spacing within leases exist.

One use of property during drilling operations is the requirement for mud pits. These pits are leveled as soon as possible after completion of operations unless otherwise requested by the surface owner or user. Pits must be "constructed and maintained so as to prevent pollution of surface and subsurface fresh water," and they must be fenced off with at least four strands of barbed wire unless the surface owner, user or Superintendent gives consent otherwise. The pits also must be of adequate size to contain mud or deleterious substances extracted from wells, and must have sufficient storage to contain a supply of mud to be used in emergencies. No earthen pits, except those used for drilling, completion, recompletion, or workover of a well can be constructed, enlarged, reconstructed, or used without the approval of the Superintendent. Furthermore, unlined pits cannot be used for the continued storage of salt water or other deleterious substances; these substances must be placed in properly line receptacles and not be permitted to escape. Where existing facilities for disposal of such substances are inadequate the Superintendent gives instructions as to their disposal.

During drilling and other operations, lessees are required to keep accurate and complete records on all wells. These records must show the formations penetrated, the content and character of oil, gas, or water in each formation; and the kind, weight, size, landed depth, and cement record of casing used in drilling each well. Lessees are required to protect all freshwater zones from the surface downward: "Lessee shall, to the satisfaction of the Superintendent, take all proper precautions and measures to prevent damage or pollution of oil, gas, fresh water and other mineral bearing formations" (25 CFR 226.35).

Production

When completing an oil well (or several closely grounded wells) for production, several types of associated equipment area needed; access roads are maintained for producing wells. Tank batteries are setup for individual or grouped wells. Lessees must pay fees for tank sites (not to exceed 50 feet square) at the rate of $40 per tank or other vessel. No fee is due for a tank temporarily set up for drilling, completing or testing a well. For tanks occupying more than 50 feet square, fees are agreed upon between surface owners and lessee or are fixed by arbitration. Pipelines, electrical lines, and associated appliances also are a necessity for each set of wells and tank batteries. Lessees and surface owners must meet and agree to the routing of these lines and tank locations or the routes are set by the Superintendent. No fees are required for placement of the lines, but damages may be claimed for their installation.

Formation water is produced along with the oil. The water is generally high in dissolved salts, especially sodium chloride, and is usually disposed of by reinjecting it through nearby wells into the formation from which it is derived. The surface disposal of deleterious formation water in watercourses such as streams or freshwater ponds is prohibited. Reworking of old oil wells to increase production can include acid treating, redrilling, hydraulic fracturing, or otherwise improving well productivity. Reworking of wells is common in Osage County, but carrying out these operations requires approval of the Osage Agency. A workover permit application (Osage Form 139) must be completed and approved before the action is initiated.

Production royalties from oil, gas or combination oil/gas wells is one of the primary sources of income for the Osage Minerals Estate. The royalty on oil is generally 16 2/3 percent of the gross proceeds from sales after deducting the oil used for development and operation on the lease. In cases where oil production is more than 100 barrels per day on all wells within any one quarter section or portion thereof, the oil royalties are not less than 16 2/3 percent. With advanced recovery methods in use for additional oil recovery, a revised royalty rate of not less than 12.5 percent can be authorized by the Osage Minerals Council with the approval of the Superintendent. All gas royalty money is collected on the basis of not less than 16 2/3 percent of the market value per 1000 cubic feet. The Osage Minerals Council has also negotiated royalties in excess of 16 2/3 percent.

Well Abandonment and Plugging Procedures

Both dry holes and old wells which are no longer economically productive must be plugged. Prior to abandonment, a plugging permit (Figure 8) is required from the Osage Agency. In all cases, lessees are required to plug and fill holes in a manner which confines a fluid (fresh water, oil, gas, salt water) to its own formation, and prevents the transmission of fluids between formations. Mud-laden fluid, cement, and other plugs must be used to fill each hole from bottom to top unless satisfactory agreements are reached between lessees and surface owner (subject to approval by the Superintendent). Within 10 days after plugging, lessees must file a complete report with the Superintendent regarding the plugging of each well. When any well is plugged as a dry hole or abandoned as a producer and plugged, the casing must be cut off three feet below ground level and lessees are allowed 90 days to clean up the area surrounding the well site to the satisfaction of the Superintendent. After all the above actions have taken place, surface owners

can make claim to lessees for alleged damages, and all damages are settled in accordance with 25 CFR 226.

Each application for plugging must be accompanied by a fee of $15. For failure to notify the Superintendent before plugging or abandoning any well, a fine of $200 can be imposed. For failure to file plugging reports a fine of $10 per day for each violation until compliance is met can be levied.

Transportation and Transmission

In Osage County there are currently about 2,000 miles of paved highways which are maintained by district offices of the Oklahoma State Department of Transportation, Division of Highways. Several new roads are currently funded for pending construction. In addition, about 3,000 miles of oil company roads are maintained by lessee for day-to-day operations of their properties. Approximately 150 miles of unpaved gravel roads are constructed annually to carry out new oil and gas field operations.

In all, about 13,500 wells in the county are checked on a scheduled basis by oil field pumpers who normally make their rounds in pickup trucks. Workover units, drilling rig vehicles, cementing trucks, logging trucks, acidizing trucks and other vehicles also use the roads in drilling about 500 wells and reworking about 3,000 wells annually, Oil trucking firms also use the roads to deliver oil from tank batteries to gathering points or refineries. These companies presently truck about 6 percent of all oil produced in Osage County, and normally carry 160 to 200 barrels of oil per load. Most of the oil is presently trucked to Cushing and Tulsa, Oklahoma for refining or redistribution. Pipelines also run to these refining centers. The major mode of movement of gas, oil, formation water and secondary recovery chemicals is by pipeline.

Several major interstate pipelines cross Osage County. The inside diameters (ID) of the largest crude oil lines are 24" (ARCO). The largest natural gas lines are several Cities Service lines with 16' ID. Many interstate product lines also cross the county, with the majority of these converging at Barnsdall. The Osage Agency, the Osage Nation, nor the U.S. Department of Interior have any regulatory authority over interstate pipeline operations (including spill prevention or cleanup), unless those pipelines are located on restricted or trust Indian lands in Osage County. The Superintendent of the Osage Agency must approve route locations of interstate lines on restricted Indiana lands.

In addition to the major interstate lines, about 49 percent of all oil and essentially all of the natural gas is piped to tank batteries or gathering centers through lines ranging in size from 2" ID to 6" ID. It is estimated that several hundred miles of pipelines used for brine disposal or injection are presently in use in the county. The countywide total estimate (Osage Agency, 1978) for all major oil, gas, or saltwater lines used to deliver products to their proper location for sale or disposal is about 8,000 miles of pipelines. Approximately 150 to 200 miles of new pipelines are being installed annually (1978 rate) due to new oil and gas operations. This level of activity is not expected to change in the foreseeable future.

Safety and Environmental Controls

The oil and gas leasing program in Osage County is subject to numerous Federal and Osage Agency regulations which guard personal safety and environmental conditions. As in other parts of the country where oil and gas drilling and production are taking place, the rules of the Occupational Safety and Health Administration (OSHA, U.S. Department of Labor) are in effect in Osage County. These rules apply primarily to workers at industrial sites and include such protection as specifying hardhats in drilling areas, ear protection when working around machinery with high noise levels, and so forth.

The U.S. Environmental Protection Agency is the regulatory agency which is charged with enforcement of the Oil Spill Pollution Prevention regulations, 40 CFR, Part 112. These regulations were enacted to control oil spills with regard to non-transportation related onshore and offshore activities. The inspection process put forth in these regulations has been in effect in Osage County. Fresh water is further protected under Federal regulations of the Safe Drinking Water Act (1974, amended 1977) and the Clean Water Act (1972, amended 1977) which are administered by the Environmental Protection Agency.

To bring the BIA Osage Agency into conformity with the purposes, intent and procedures set forth in the National Environmental Policy Act (NEPA, 1969), a NEPA compliance process has been established to ensure that all Federal actions have complied with the guidance set forth in Title 43, Code of Federal Regulations (CFR), Part 46, Implementation of the National Environmental Policy Act (NEPA) of 1969 for the Department of the Interior, 59 Indian Affairs Manual 3-H, the BIA NEPA Guidebook.

It should be noted, however, that specific sections dealing with environmental protection have been incorporated into Osage Agency regulations since at least 1932. Regulations and permit requirements of the Osage Agency have therefore stressed safety and environmental protection since long before NEPA came into effect. The 1932 regulations, for example, included the following controls: when drilling in wildcat territory or known high pressure fields, a lessee must have an approved control device installed to protect against blowouts; all pollution is specifically prohibited with respect to surface water, mud pits and plugging (subsurface formations protected); and, with respect to surface operations and possible damage to streams, ponds, soil and vegetation, all salt water and other deleterious substances must be contained in appropriate receptacles and properly disposed.

Under current regulations, all well drilling, reworking and plugging must be accomplished in a manner that will prevent migration of oil, gas, saltwater, or other substance from one subsurface stratum to another, including any fresh-water-bearing formation. These requirements are specifically noted in the drilling permits and plugging permits which are issued by the Osage Agency. Since these permits came into effect much in advance of the effective date of the Oil Spill Pollution Prevention regulations (40 CFR, Part 112), it is obvious that management of the Osage Minerals Estate has been conscientiously working to maintain an unpolluted environment in Osage County for many decades.

In the event of accidents, fires, brine or oil spills, or other problems at well sites in Osage County, a lessee is required to file a report with the Osage Agency. If a surface landowner has a grievance as a result of any oil and gas activity, as soon as possible after the discovery of any damages, he must serve a written notice to the appropriate lessee or their representative. This notice must contain the nature and location of alleged damages, the date of occurrence, the names of the parties causing the damages, and the amount of damages. If arbitrated settlement cannot be made, action may be brought in court against the alleged party causing the damages.

The Osage Agency can levy fines on lessee or operators for not properly adhering to environmental regulations. For failure to construct and maintain mud pits as required, a fine of $10 per day of operations after commencement can be levied on any well until compliance is met. For failure to have a proper valve or other blowout control device installed at each drilling, a fine of $100 can be levied. For failure to properly care for and dispose of sludge, saltwater or other deleterious substance, a fine of $100 per day can be levied and, in the event of failure to comply within 5 days, a fine of $500 per day can be levied until compliance is met.

WELL PAD AND INFRASTRUCTURE LOCATIONS

Well pad locations are unknown at this time, but subsequent activities must be contained to the well pad in order to minimize impacts to the various components of the affected environment. Of particular concern are potential impacts to cultural and biological resources if the proposed operation extends beyond the existing footprint of the well pad. Failure to comply with this requirement may result in a violation of the oil/gas lease and possible termination and/or additional regulatory actions, fines or criminal penalties for violation of various federal laws, including but not limited to the Endangered Species Act, Archeological Resources Protection Act, Clean Water Act, and Clean Air Act.

Well Pads

The well pads where proposed operations will occur will most likely include a leveled area (pad) that would be used for the original drilling rig and other operation and maintenance equipment. The well pad was stripped of topsoil and vegetation and then graded. The topsoil was stockpiled and stabilized with native grasses until it could be used to reclaim and revegetate the disturbed area during final reclamation of the site.

The best management practices (BMPs) included in Section 14.24 may be utilized for erosion control associated with operations and could include surface drainage controls, soil surface protection methodologies, and sediment capture features.

Reclamation

Interim Reclamation

Reclamation would continue over the life of each well pad and would include the return of topsoil, and contouring and seeding of native vegetation. Interim reclamation would be required following any maintenance work or additions of infrastructure. Reclamation would be required

before final abandonment of the decommissioned well pad. A successful reclamation would at all times be the responsibility of the operator.

The Applicant would control any noxious weeds within the project area and other applicable facilities by approved chemical or mechanical methods, according to the weed management plan developed by the BIA to treat known or likely to occur noxious weed species. If seeding of the area does not occur due to growing season constraints, the Applicant would deploy approved weed-free hay across the entire disturbed area to reduce the potential for excessive erosion as a result of spring snow melt and precipitation.

The entire project area would be monitored for erosion, subsidence, and noxious weeds. In areas where problems are found to occur, reclamation efforts would continue until the BIA feels the area is successfully reclaimed. Reclamation is considered successful when:

- seeded areas are established;
- adjacent vegetative communities spread back into the disturbed areas; and
- noxious weeds are under control.

If the new seeding is not successful after two growing seasons, the BIA may require additional efforts to establish vegetation.

WORKOVER AND MAINTENANCE ACTIVITIES

Exploration, drilling and the following extensive list of potential workover activities associated with the operation and maintenance of existing permitted and operating wells in Osage County must comply with 25 CFR Part 226.16, the following activities cannot be permitted unless the tract of land has an approved oil and/or gas mining lease approved by the BIA Osage Agency.

- Acid Frac - A well-stimulation operation in which acid, usually hydrochloric (HCl), is injected into a carbonate formation at a pressure above the formation-fracturing pressure.

- Acid Job - The treatment of a reservoir formation with a stimulation fluid containing a reactive acid.

- Adding additional Perforations - Creation of additional communication tunnels that are created from the casing or liner into the reservoir formation, through which oil or gas is produced.

- Cement Retainer - An isolation tool set in the casing or liner that enables treatments to be applied to a lower interval while providing isolation from the annulus above.

- Converting producing wells to Water Injection (WI) or Salt Water Disposal (SWD) - The act of converting a well to inject or dispose of water in an underground reservoir.

- Deepening - To extend a well bore to a deeper geologic zone for production purposes.

- Gas to Oil Well Conversion - To make previous gas production well a primary production crude oil well.

- Oil to Gas Well Conversion - To make previous oil production well a primary production natural gas well.

- Re-drilling a previously plugged well- To enter and re-drill the bore by drilling the cement out of a hole. Most commonly refers to drilling a bridge plug out

- Running a Liner- A technique that minimizes formation damage and gives the ability to control sand.

- Setting Bridge Plug- A downhole tool that is located and set to isolate the lower part of the wellbore.

- Squeeze Job - The process of injecting cement slurry into a zone, generally for pressure-isolation purposes and to repair leaks in the casing of a well bore.

AIR QUALITY[1]

Typical Air Emissions from Oil Field Development

According to EPA Emission Inventory Improvement documents (EPA 1999), oil field emissions encompass three primary areas: combustion, fugitive, and vented. Typical processes that occur during exploration and production include the following.

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and hazardous air pollutants (HAPs). Sources include engine exhaust, dehydrators, and flaring (EPA 1999).
- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources of fugitive emissions include mechanical leaks from well field equipment such as valves, flanges, and connectors that may occur in heaters/treaters, separators, pipelines, well heads, and pump stations. Pneumatic devices such as gas actuated pumps and pressure/level controllers also result in fugitive emissions. Other sources of fugitive emissions include evaporation ponds and pits, condensate tanks, storage tanks, and wind-blown dust (from truck and construction activity) (EPA 1999).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents (EPA 1999).

Pad and road construction, drilling activities, and tanker traffic would generate emissions of criteria pollutants and HAPs. Primary emissions sources during drilling are diesel exhaust; wind-blown dust from disturbed areas and travel on dirt roads; evaporation from pits and sumps; and gas venting. Diesel emissions are being progressively controlled by the EPA in a nationwide program (EPA 2012c). This program takes a two-pronged approach. First, fuels are improving to the ultra-low sulfur standard, and secondly manufacturers must produce progressively lower engine emissions.

Greenhouse Gas Emissions and Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide (CO_2) occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The EPA (2012c) identifies the principal GHGs that enter the atmosphere because of human activities as the following.

- **CO_2:** CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4):** CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- **Nitrous Oxide (N_2O):** N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **Fluorinated Gases:** Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are typically emitted in small quantities, but are potent GHGs thought to contribute significantly to global warming processes (EPA 2012b).

CO_2 is the primary GHG, responsible for approximately 90% of radiative forcing (the rate of energy change as measured at the top of the atmosphere; can be positive [warmer] or negative [cooler]) (EPA 2012b). To simplify discussion of the various GHGs, the term "Equivalent CO_2 or CO_2e" has been developed. CO_2e is the amount of CO_2 that would cause the same level of radiative forcing as a unit of one of the other GHGs. For example, one ton of CH_4 has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as one ton of CH_4. N_2O has a CO_2e value of 310. Thus, control strategies often focus on the gases with the highest CO_2e value.

According to the Pew Center, "Over the past 50 years, the (worldwide) data on extreme temperatures have shown similar trends of rising temperatures: cold days, cold nights, and frosts occurred less frequently over time, while hot days, hot nights, and heat waves occurred more frequently" (Pew Center 2009). Generally, the earth's temperature has increased about one degree Celsius since 1850 but some areas have seen an increase of four degrees. Sea levels are also rising, mountain glaciers are disappearing, and ocean currents, such as the Gulf Stream, are slowing (Intergovernmental Panel on Climate Change [IPCC] 2007).

Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. The IPCC Working Group I Fourth Assessment compiles and analyzes global data on climate change, and reports that warming of the climate system is evident from global observations of increases in average air and ocean temperatures, widespread melting of snow and ice, and rising average sea levels (IPCC 2007). Globally, 11 of the 12 years between 1995 and 2007 ranked among the warmest years in the instrumental record of global surface temperature since 1850 (IPCC 2007). The National Oceanic and Atmospheric Agency monitoring data indicated that 21 of the 30 years

between 1979 and 2009 had above average temperatures in the contiguous United States, with departures from average temperatures occurring with increasing frequency, as shown in Figure10- (National Oceanic and Atmospheric Agency 2010).

Many physical and biological effects have been observed to correlate with trends in global warming. Sea levels are rising worldwide and along much of the United States coast (EPA 2013a). Tide gauge measurements and satellite altimetry suggest that sea levels have risen worldwide approximately 4.8 to 8.8 inches during the last century (IPCC 2007). A significant amount of sea level rise has likely resulted from the observed warming of the atmosphere and the oceans. Hydrological systems, ice pack, and permafrost are also affected by higher oceanic and atmospheric temperatures, affecting biological systems and agriculture (IPCC 2007).

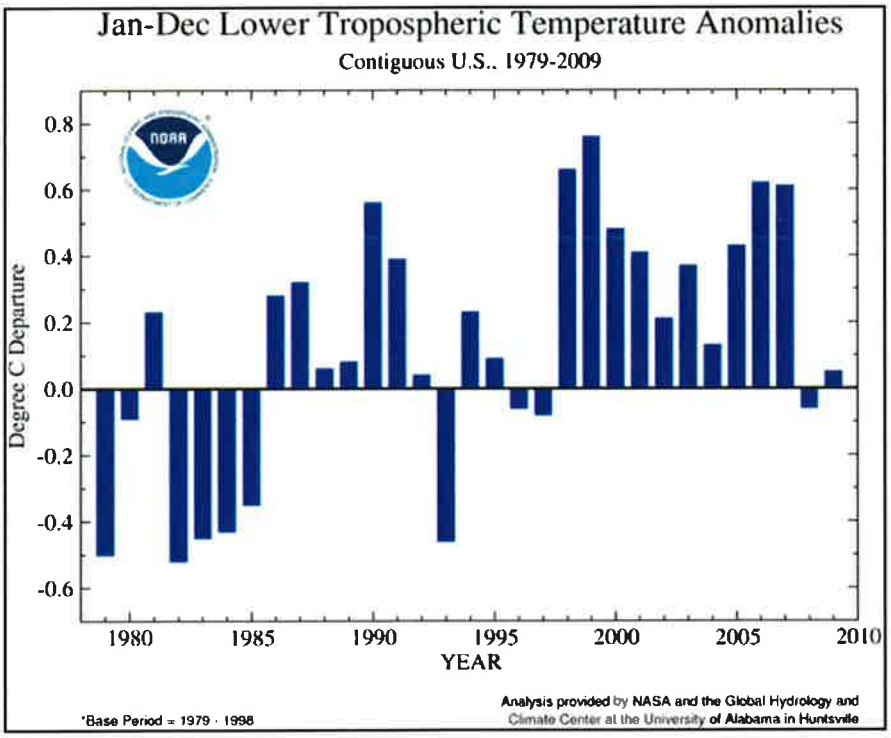

Figure10-4 Temperature anomalies in the contiguous United States, 1979–2009.

IPCC experts concluded that most of the observed increase in globally averaged temperature since the mid-twentieth century is very likely due to the observed increase in anthropogenic GHG concentrations (IPCC 2007). Therefore, the EPA collects data on and encourages limiting or reducing emissions of anthropogenic sources of GHGs to the earth's atmosphere (EPA 2012b). Many U.S. states have adopted goals and actions to reduce GHGs. The EPA and the National Highway Traffic Safety Administration have increased corporate fuel economy standards to promote national energy security and reduce GHGs. Standards would equal 35 miles per gallon by 2020, with an estimated savings to drivers of $100 billion annually (EPA 2012c).

Energy production and supply was estimated to emit up to 25.9% of GHGs world-wide in 2004 (Pew Center 2009). CH_4, with a high radiative forcing CO_2 ratio, is a common fugitive gas

emission in oil and gas fields (EPA 2012b). Oil and gas production, however, is highly variable in potential GHG emissions. Oil and gas producers in the United States are not considered large GHG emitters by the EPA, and are not the subject of any current federal proposals that would regulate GHG emissions.

Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are a class of compounds known to cause cancer, mutation, or other serious health problems. HAPs are usually a localized problem near the emission source. HAPs are regulated separately from criteria air pollutants. There are several hundred HAPs recognized by the EPA and State of Oklahoma. Health effects of HAPs may occur at exceptionally low levels; for many HAPs, it is not possible to identify exposure levels that do *not* produce adverse health effects. Major sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), wood smoke, and motor vehicle exhaust. Unlike regulations for criteria pollutants, there are no ambient air quality standards for HAPs. Examples of HAPs found in gases released by oil field development and operation include benzene, toluene, xylene, and formaldehyde (BLM 2009). HAP emissions receive evaluation based on the degree of exposure that can cause risk of premature mortality, usually from cancer.

Air Quality Best Management Practices

Under the CAA, federal land management agencies have an affirmative responsibility to protect air quality. Tribes, federal land managers, and private entities can make emission controls part of a lease agreement. BMPs can be adopted for various portions of an oil/gas well's lifecycle. BMPs fall into the following six general categories.

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
  - use directional drilling to drill multiple wells from a single well pad;
  - use centralized water storage and delivery, well fracturing, gathering systems;
  - use telemetry to remotely monitor and control production;
  - use water or dust suppressants to control fugitive dust on roads;
  - control road speeds; and
  - use van or carpooling.
- Drilling BMPs to reduce rig emissions
  - use cleaner diesel (Tier 2, 3, and 4) engines;
  - use natural gas-powered engines; and
  - use "green" completions to recapture product that otherwise would have been vented or flared.
- Unplanned or emergency releases
  - use high-temperature flaring if gas is not recoverable.
- Vapor recovery
  - use enclosed tanks instead of open pits to reduce fugitive VOC emissions; and
  - use vapor recovery units on storage tanks.

- Inspection and maintenance
  - use and maintain proper hatches, seals, and valves;
  - optimize glycol circulation and install a flash tank separator;
  - use selective catalytic reduction; and
  - replace high-bleed with low-bleed devices on pneumatic pumps.
- Monitoring and repair
  - use directed inspection and maintenance methods to identify and cost-effectively fix fugitive gas leaks.

14.10.1.1 POTENTIAL AIR QUALITY IMPACTS[1]

Based on the existing air quality of Osage County, typical air levels and types of emissions from similar oil field projects, and the applicants' commitment to implementation of BMPs identified in this Appendix, subsequent oil field development and production activities that may occur due to the leasing action, would not produce significant increases in criteria pollutants, GHGs or HAPs. These activities would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions would occur predominantly during construction and drilling operations and therefore would be localized, largely temporary, and limited in comparison with regional emissions. Development activities would not be expected to impact attainment status based on any of the Primary and Secondary National Ambient Air Quality Standards for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

14.10.2 HYDRAULIC FRACTURING PROCESS

HF is a well stimulation process used to maximize the extraction of oil and gas. The process enhances subsurface fracture systems, allowing oil to move more freely through porous rock to production wells that bring the oil or gas to the surface (EPA 2013b). During HF, fluids, commonly comprised of water and chemical additives, are pumped down the well bore into these target formations at high pressure. The HF process uses large volumes of water under high pressure to fracture rock within the target formation to increase formation porosity and allow the flow of petroleum from the rock. Depending upon the characteristics of the well and the rock being fractured, a few million gallons of water can be required to complete a job (Arthur et al. 2008).

Only specific sections of the well within the target formation receive the full force of pumping. As pressure builds up in this portion of the well, water opens fractures, and the driving pressure extends the fractures deep into the rock unit. When pumping stops, these fractures quickly snap closed and the water used to open them is pushed back into the borehole, back up the well and is collected at the surface. The water returned to the surface is comprised of injected water mixed with the pore water that has been trapped in the rock unit for millions of years. The pore water is usually a brine with significant amounts of dissolved solids (Arthur et al. 2008).

When the pressure exceeds the rock strength, the fluids open or enlarge fractures that can extend several hundred feet from the well shaft, which is oriented laterally within the target formation. After the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released. After HF is completed, the internal pressure of

the geologic formation causes the injected HF fluids to rise to the surface where they are stored in disposal tanks (EPA 2013b).

Proppants are small compression-resistant particles added to the HF fluids to assist in holding the fractures open and creating pore space through which petroleum can flow. Sand was the original proppant but now aluminum beads, ceramic beads, sintered aluminum (i.e., bauxite), and other materials are being used in the wells. Over one million pounds of proppants can be used during HF of a single well (Arthur et al. 2008).

In addition to proppants, a variety of chemical additives are included with the water used in HF. Some chemicals are used to thicken the water into a gel that is more effective at opening fractures and carrying proppants deep into the rock unit. Other chemicals are added to reduce friction, keep rock debris suspended in the liquid, prevent corrosion of equipment, kill bacteria, control pH, and other functions (Arthur et al. 2008). Typical chemical additives used in the HF fluids are listed in the below table.

Table 10-8. Common Additives of Hydraulic Fracturing Fluid.

Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic acid	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium chloride	Food preservative
Corrosion inhibitor	N,n-dimethyl formamide	Used as a crystallization medium in pharmaceutical industry
Friction reducer	Petroleum distillate	Cosmetics including hair, make-up, nail, and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickener used in cosmetics, sauces, and salad dressings
Iron control	2-hydroxy-1,2,3-propanetricaboxylic acid	Citric acid is used to remove lime deposits; lemon juice ~7% citric acid
Oxygen scavenger	Ammonium bisulfite	Used in cosmetics
Proppant	Silica, quartz sand or clay beads	Play sand (seldom used)
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing agent

Source: Arthur et al. 2008.

14.10.3 WATER QUALITY

Drilling activities should be engineered and constructed to: (1) avoid contact with pollutants and contaminants, including but not limited to brine, oil residues and sediments, (2) minimize in any runoff or discharges the amount of suspended sediment (i.e., turbidity) and the concentration of contaminants, and (3) avoid alteration of natural drainages. Compliance with applicable federal water quality standards is required at all times. No surface water would be converted for use as a lagoon or pit or otherwise used for well drilling operations. Any chemicals or potentially

hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan (SPCC Plan). The site specific SPCC plan must be designed to minimize potential impacts to any surface waters associated with an accidental spill.

Water quality is protected under the Federal Water Pollution Control Act (as amended), otherwise known as the Clean Water Act (CWA). The CWA has developed rules for regulating discharges of pollutants into waters of the U.S. and also regulates water quality standards for surface waters. The CWA has also made it unlawful to discharge any pollutant from a point source into any navigable waters of the U.S., unless a permit has been obtained from the National Pollution Discharge Elimination System program.

Subsequent oil field development and production activities would be engineered and constructed to minimize the suspended sediment (i.e., turbidity) concentration of surface runoff, avoid disruption of drainages, and avoid direct impacts to surface water. No surface water would be used for well drilling operations. Any chemicals or potentially hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan. Provisions established under this plan would minimize potential impacts to any surface waters associated with an accidental spill.

14.10.4 POTENTIAL IMPACTS TO SURFACE WATER AND GROUNDWATER RESOURCES

Since the introduction of technological advances in HF, some environmental concerns have been published related to the use of chemical additives and their potential effect on groundwater resources. These concerns, reviewed in Arthur et al. (2008), include the following.

1. Fractures produced in the well might extend directly into shallow rock units that are used for drinking water supplies, or fractures produced in the well might communicate with natural fractures that extend into shallow rock units that are used for drinking water supplies.

2. The casing of a well might fail and allow fluids to escape into shallow rock units used for drinking water supplies.

3. Accidental spills of HF fluids or fluids expelled during HF might seep into the ground or contaminate surface water.

The EPA has studied the effects of coalbed methane well fracturing, publishing the results in a report entitled *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (EPA 816-R-04-003) in 2004 (EPA 2004). The report has received both internal and external peer review, and public comment on its research design and incident information. Based on its research, the EPA concluded that there was negligible risk of HF fluid contaminating underground sources of drinking water during HF of coalbed methane production wells. However, the EPA continues to monitor the effects of HF in coalbed methane well completion (EPA 2004). The EPA is currently undertaking a study to evaluate the effect of oilfield HF technology, processes, and fluids on potable water aquifers. The EPA study is expected to be completed in 2014 (EPA 2013b). Oil-bearing formations typically occur much deeper than potable water aquifers.

No direct or indirect impacts to surface water or groundwater resources are anticipated from drilling of the proposed wells, HF completions, or operation of the proposed wells due to the following.

- The use of closed-loop drilling without a cuttings pit, construction BMPs (Section 4.13), and spill prevention planning during the construction phase of the project.
- Implementation of site-specific measures to reduce long-term erosion and runoff into nearby surface water bodies.
- The use of protective casings on the well shafts to protect shallow water-bearing rock formations during drilling and operation of the oil wells.

Several groundwater protective measures have been included in the drilling and production procedures, such as drilling with freshwater to a point below the base of certain formations, implementing proper hazardous materials management, and using appropriate casing and cementing. The intent of the Proposed Action is to minimize the risks associated with saltwater and hydrocarbon pollution. Based on the location, design, and the drilling methods that would be used on the proposed well pads, no significant adverse impacts to surface water or groundwater resources are anticipated from the Proposed Action.

14.10.5 POTENTIAL IMPACTS FROM SOIL EROSION

General

Precautions would be taken during construction activities to prevent erosion. Proven BMPs are known to significantly reduce erosion of various types of soil, including those in the project area (BLM Instruction Memorandum 2004-124, www.blm.gov/bmp; BLM and USFS 2007; Grah 1997).

Most soil types in Osage County are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Topsoil stripped from areas of new construction would be retained for use during reclamation. Any areas stripped of vegetation during construction would be recontoured to original topographic variations and seeded with an approved native species mixture within 6 months of construction cessation, environmental conditions permitting. The implementation of BMPs (Section 4.13) by the operator would reduce project effects and maintain negligible levels of erosion; therefore, no significant adverse impacts to soil resources are anticipated.

Specific erosion control measures would be implemented at well pads impacted by workover operations. Specifically, the following measures may be utilized if deemed appropriate and include the installation of berms along the outer edges of the well pads, Straw wattles (as needed) and matting or hydroseeding on all fill slopes would be used to prevent erosion needed.

14.10.6 POTENTIAL IMPACTS ON VEGETATION AND NOXIOUS WEEDS

The Proposed Action may result in slight loss of vegetation that has revegetated the historical well pad site of the currently operating well pad. It is assumed that all workover operations must stay within the limits of the original well pad and so vegetative impacts would be kept a minimum. In addition to the removal of typical native grasslands, removal of existing vegetation may facilitate the spread of noxious weeds. This EA requires the operator to control noxious

weeds throughout the project area. If a noxious weed community is found, it would be eradicated unless the community is too large, in which case it would be controlled or contained to prevent further growth. The services of a qualified weed control contractor would be utilized.

Surface disturbance and vehicular traffic would not take place outside approved ROWs for the well pads, access roads, and utilities. Areas that are stripped of topsoil would be seeded and reclaimed at the earliest opportunity. Additionally, certified weed-free straw and seed would be used for all construction, seeding, and reclamation efforts. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

With implementation of BMPs (Section 4.13) and noxious weed management guidelines, any acreage disruption would result in negligible levels of vegetation disturbance and would not result in significant adverse impacts to vegetation resources.

The Proposed Action would result in some loss of vegetation and ecological diversity. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and further fragmentation, of native habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use native habitats. Such impacts could be partially offset by implementation of soil and vegetation mitigation measures and BMPs (Section 4.13). Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

Efforts to reduce the spread of noxious weeds would be made during the project construction and maintenance processes. The following guidelines would be followed during construction, reclamation, and maintenance stages of the project to control the spread of noxious weeds.

- Construction equipment, materials, and vehicles would be stored at construction sites or at specified construction yards.
- All personal vehicles, sanitary facilities, and staging areas would be confined to a limited number of specified locations to decrease chances of incidental disturbance and spread of weeds.
- In areas with existing noxious weed infestations, vegetation, soils, and trench spoil material would be stockpiled adjacent to the removal point and, following construction, would be returned to its original locations to prevent spreading.
- Prompt re-establishment of the desired vegetation in disturbed areas is required. Seeding would occur during the frost-free periods after construction. Certified "noxious weed-free" seed would be used on all areas to be seeded.

1.1.7 POTENTIAL IMPACTS TO WILDLIFE

Proposed workover operations may result in short-term change to plant and animal species composition and altered utilization of the site and surrounding area by wildlife until reclamation occurs. Wildlife will be temporarily displaced, but the effects are short-term.

Depending on the level of revegetation of the well pad through interim reclamation since the original drilling activity, proposed workover operations may remove enough vegetation to reduce the total food, cover, and space for wildlife in the area. It is expected that wildlife species will temporarily relocate from the area during the implementation of the workover operation to avoid direct mortality due to the increase in human presence, and levels of noise.

Use of the general wildlife resource mitigation measures and standard BMPs should provide adequate protection to general wildlife populations and their habitats in the project area. For additional information on general BMPs and other operator-committed measures, please see Section 4.13, Mitigation and Monitoring.

14.10.8 THREATENED AND ENDANGERED SPECIES

Section 7 of the Endangered Species Act (16USC 1531 et seq.) requires that federal agencies, in consultation with the USFWS, ensure that their actions are not likely to jeopardize the continued existence of any listed species, or result in adverse effects on designated critical habitat of such species. The Endangered Species Act also prohibits any action that results in a "taking" of any listed federally protected plant, fish or wildlife species. The Applicant and the BIA must ensure that the proposed action does not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the adverse modification of a federally designated critical habitat of a listed species.

14.10.9 MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 40 Stat. 755 as amended) protects migratory birds and most resident birds that are native to the United States. According to the MBTA, it is illegal to pursue; hunt; take; capture; kill; attempt to take capture, or kill; and active nests (and the eggs or young within). The MBTA does not prohibit harassment, disturbance, or habitat removal and alternations. Thus, MBTA prohibitions most relevant to the proposed action involve killing of a chick or egg through destruction of an active nest.

Use of the general wildlife resource mitigation measures and standard BMPs should provide adequate protection to general wildlife populations and their habitats in the project area. The USFWS estimates that many migratory birds are killed annually throughout the United States in oil field production skim pits, reserve pits, and centralized oilfield wastewater disposal facilities. Numerous grasshoppers, moths, June bugs, and the like become trapped on the surface in tanks and on pits, and become bait for many species of migratory birds. Open tanks and pits then become traps to many species of birds protected under the MBTA.

Unlike the MBTA, the Bald and Golden Eagle Protection Act (BGEPA) prohibits disturbance of eagles and the destruction of both active and inactive nests. Under BGEPA, permit programs are available that may allow the Applicant to take an inactive nest of to disturb eagles at an active

nest or eagle concentration area, if avoidance and minimization measures are implemented in coordination with the USFWS and the threshold of take for the regional eagle population has not be exceeded. In order to comply with the BGEPA, applicants must avoid clearing trees with eagle nests, unless the USFWS is contacted. In addition, during clearing and construction the Applicant must plan to avoid disturbing adult bald eagles, chicks and fledglings within the appropriate disturbance distance identified by the USFWS from the project site during the breeding season.

1.1.10 AGRICULTURE

Ranching is the main enterprise in Osage County. According to the 2007 Agricultural Census, livestock sales accounted for $127 million, or 96 percent, of the total agricultural market. Osage County ranks 9th out of the 77 counties in Oklahoma in total value of agricultural products sold (USDA NASS 2007a). The average operating ranch unit is approximately 83.5 acres. About 75 percent of the land in farms or ranches is open range, 12 percent is wooded range, 7 percent is cropland, and 6 percent is tame pasture. Small grains, mainly wheat, alfalfa, grain sorghums, and soybeans are the principal crops. Corn and sorghums cut for silage and used by local dairies, and orchard crops are grown on a minor acreage. A large acreage of native grasses and tame pastures are cut for hay which is mostly used by local farms and ranchers. The other crops are shipped to local and distant markets and sold for cash. Approximately 75 percent of the annual production on rangeland grows in April, May, and June coinciding with spring rains and moderate temperatures. A secondary growth period generally occurs in September and October coinciding with fall rains and cooling temperatures (USDA NRCS 2012a).

1.11 CULTURAL RESOURCES

If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Following any such discovery, operations shall not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. The presence of qualified cultural resource monitors during construction activities is encouraged.

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the Proposed Action.

1.12 PUBLIC HEALTH AND SAFETY

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The Osage County Sheriff's department as well as several local agencies provides law enforcement services. In addition, the Osage Nation Police Department (ONPD) is charged with enforcing all tribal, state, and federal laws on the Osage Nation Reservation. The ONPD is directed by a Chief of Police who is responsible for the day to day operations of the police department (Osage Nation 2012). Fire and emergency response is the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, and Wynona. The Osage Nation Emergency Management Agency provides fire protection for the restricted and trust land on the Osage Reservation.

Health and safety concerns include H_2S gas that could be released as a result of drilling activities, hazards introduced by heavy truck traffic, and hazardous materials used or generated during construction, drilling, and/or production activities.

H_2S is extremely toxic in concentrations above 500 parts per million and is known to occur in varying concentrations within the Osage Nation Minerals Reservation. Contingency plans submitted to the BIA comply fully with relevant portions of Onshore Oil and Gas Order No. 6 to minimize potential for gas leaks during drilling. Emergency response plans protect both the drilling crew and the general public within 1 mile of a well; precautions include automated sampling and monitoring by drilling personnel stationed at each well site.

Standard mitigation measures would be applied, and because release of H_2S at dangerous concentration levels is very unlikely, no direct impacts from H_2S are anticipated with implementation of the Proposed Action.

All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and county roadways and haul permits would be acquired as appropriate.

The EPA specifies chemical reporting requirements under Title III of the Superfund Amendments and Reauthorization Act (SARA), as amended. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the Proposed Action. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported, or disposed of in association with the Proposed Action. All operations, including flaring, would conform to instructions from BIA fire management staff.

Spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical toilet during drilling. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

14.13 HAZARDOUS MATERIALS

The Pipeline and Hazardous Materials Safety Administration (PHMSA), a federal agency within the USDOT, is the primary federal regulatory agency responsible for ensuring the safety of

American's energy pipelines, including crude oil pipeline systems. As a part of the responsibility, PHMSA established regulatory requirements for the construction, operation, maintenance, monitoring, inspection and repair of hazardous liquid pipeline systems.

Hazardous substances are defined as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health and the environment. Hazardous substances are primary generated by industry, hospitals, research facilities, and the government. Improper management and disposal of hazardous substances can lead to pollution of groundwater or other drinking water supplies and the contamination of surface water and soil. The primary federal regulations for the management and disposal of hazardous substances are the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

Safety and security issues considered in this EA include the health and safety of the area residents and the public-at-large, and the protection of personnel involved in activities related to the proposed management activities. Executive Order 13045 (Protection of Children) requires federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children.

14.14 EMERGENCY RESPONSE

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The county has a Sheriff's department and in addition several towns within the county have local law enforcement. On November 8, 1994 pursuant to the National Council Bill Number 10; the Osage Nation elected to establish a law enforcement agency to be called the Osage Nation Police Department (ONPD). The ONPD is charged with enforcing all laws including Tribal, state, and federal in Osage County.

Fire and emergency response with the RMP planning area is the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, Wynona, Pawhuska, among others, and including rural volunteer fire department. The Osage nation Emergency Management Agency provides fire protection for the restricted and trust lands in Osage County.

14.15 POTENTIAL IMPACTS TO PUBLIC HEALTH AND SAFETY

With the implementation of the described reporting and management of hazardous materials, no adverse impacts to public health and safety are anticipated as a result of the proposed well pads. Other potential adverse impacts to any nearby residents from construction would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for a short term period (1 week or less) during implementation of the proposed workover activities.

14.16 POTENTIAL IMPACTS TO SOCIOECONOMICS

Impacts to socioeconomic resources of the analysis area would be incremental and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would

generally occur during the construction/drilling and completion phases of the proposed wells. Long-term effects would occur during the production phase, should the wells prove successful. Any increase in workers would result in a short-term increase in population in the project area required for short-term operations and would create an incremental increase in and for services or infrastructure within Osage County.

Implementation of the Proposed Action would likely result in direct and indirect economic benefits associated with industrial and commercial activities in the RMP planning area. Direct impacts would include increased spending by contractors and workers for materials, supplies, food, and lodging in the surrounding area, which would be subject to sales and lodging taxes. Other state and local tax payments and fees would be incurred with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those who were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

14.17 ENVIRONMENTAL JUSTICE

Executive Order 12898 directs federal agencies to develop strategies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

Table 14-26 presents a summary of information for Osage County as reported from the 2010 Census. Within Oklahoma, 16.2 percent of the population is below the poverty level. Osage County has a lower percentage than the state at 12.6 percent. The American Indian and Alaskan Native population comprises 8.6 percent in Oklahoma, while Osage County has a higher population of American Indian and Alaskan Native person than the state overall.

Table 14-26 Minority Populations in Osage County, Oklahoma

Category	Osage County %	Oklahoma %
Black persons	11.4	7.4
American Indian and Alaskan Native persons	14.4	8.6
Asian persons	0.3	1.7
Hispanic/Latino persons	2.9	8.9
Multi-racial persons	7.1	5.9

Source: USCB, 2010 Census

Table 14-26.a presents the disability status of civilian, non-institutionalized population within Osage County. The percent of the Oklahoma population 5 years and over with a disability is

21.6 percent. Osage County has a slightly higher disability rate than the state. Overall, within the three age groups, the population 65 years and over has the highest rate of disability (USCB 2000b).

Table 14-26.a Disability Status of Civilian, Non-Institutionalized Populations in Osage County, Oklahoma

Category	Osage County		Oklahoma	
	Number	%	Number	%
Population 5 to 20 years	10,600		809,597	
With a disability	870	8.2	70,153	8.7
Population 21 to 64 years	24,040		1,885,835	
With a disability	5,518	23.0	405,333	21.5
Population 65 years and over	5,582		429,566	
With a disability	2,658	47.6	200,612	46.7

Source: USCB, Census 2000 Summary File 3

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, signed in 1994 by President Clinton, requires that federal agencies advance EJ by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions, or operations. Meaningful involvement means federal officials actively promote opportunities for public participation and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Executive Order and is responsible for related legal action. Working criteria for designation of targeted populations are provided in *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998)*. This guidance uses a statistical approach to consider various geographic areas and scales of analysis to define a particular population's status under the Executive Order.

14.18 LIFESTYLES AND CULTURAL VALUES

Oklahomans are proud of their diverse cultures, scenic landscapes, and hospitality. Oklahoma has a history of rich American Indian culture and currently, Oklahoma is home to more than 67 tribes. Additionally, Oklahoma has a long standing tradition of rodeos and is home to horse and cattle ranches with working cowboys. Over 100 traditional and Indian rodeos occur through the year in Oklahoma (Shop Oklahoma 2012).

The Osage Nation is headquartered in Pawhuska, Oklahoma and has approximately 14,500 members nationwide. The Cultural Center, located in Pawhuska, was established in 2004 to maintain the ancestral traditions, values, and way of life of the Osage Nation. To maintain the

values of their ancestors and their unique identity, the Osage Nation preserves the lessons of their ancestors. The Cultural Center hosts classes on traditional Osage language; traditional craft-wear, hosts artwork exhibits, and is home to a library (Osage Nation 2012 and Shop Oklahoma 2012).

14.19 INFRASTRUCTURE

Osage County is generally rural with small farming communities and rural residences are scattered throughout; there is limited infrastructure development. There is very little urban development in the County with the exception of the southeast corner which borders the city limits of Tulsa. Communities within the planning area are served by multiple municipal services including police, fire, water, power and other utilities.

14.20 RESOURCE USE PATTERNS

Hunting, Fishing and Gathering

Oklahoma provides a diverse hunting experience with over 12 different ecological regions. The Oklahoma Department of Wildlife Conservation (ODWC) provides habitat conservation and management efforts across the state at designated Wildlife Management Areas (WMAs). Game species in the state include: antelope, bear, dove, deer, elk, furbearers, feral hogs, mountain lion, quail, peregrine, pheasant, turkey, waterfowl, and various other small game and migratory birds. Hunting seasons vary for the various species, but in general hunting occurs in the fall and winter, October through December.

Additionally, the ODWC manages and stocks lakes and ponds through the state. Fish species produced and stocked annually include largemouth bass, smallmouth bass hybrid, walleye, brown trout and rainbow trout. Annual fish stockings average 11 million fish.

Within Osage County there are 6 designated WMAs that provide opportunities for hunting, fishing and camping. Some of the WMAs include U.S. Army Corps of Engineers (USACE) operated and controlled reservoirs while the park and/or WMA is operated by the ODWC. The USACE creates reservoirs for flood control, water supply, irrigation, hydropower, navigation, recreation, and fish and wildlife (ODWC 2012c). The WMAs in the planning area include: Hula, Osage, John Dahl, Candy Creek, Keystone, and Skiatook.

Timber Harvesting

Osage County is located within the Cross Timbers ecological region (USEPA 2012a). The hardwood community consists primarily of short oak trees that are not prime timber for harvest. However, forested areas have been cleared to create open sections for rangeland, pastures, and farmland.

Recreation

Osage Hills State Park offers 1,100 acres with picnic tables and shelters, RV campsites, cabins, a swimming pool, hiking trails, a ball field, and a tennis court. Fishing for bass, crappie, catfish and perch is common in Lookout Lake or in Sand Creek at the south end of the park. The park is also used for fall foliage viewing (OHSP 2012).

Walnut Creek State Park is located on Lake Keystone and offers fishing, boating, camping, swimming, and water skiing. The 15-mile Sand Plum Trail that features flat to rolling terrain with many vistas of the lake is open to hikers, mountain bikers and horses (OTRD 2012).

Keystone State Park is located on Keystone Lake and offers boating, ATV trails, water skiing, and fishing (OTRD 2012).

Land Use Plans

The Osage County Assessor's Office provided information on the number of acres in each of the major land assessment categories. The data shows that almost 95 percent of Osage County is categorized as rural agricultural with rural residential comprising 2.6 percent of the county.

Noise and Light

The Noise Control Act (42 USC 4901-4918) initially was implemented through regulations issues by the USEPA in the early 1980s; however, the primary responsibility for regulating noise has been delegated to state and local governments.

Noise in generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds audible to the human ear. The Day-Night Average Sound Level (DNL) is an average measure of sound.

The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. USEPA guidelines, and those of many other federal agencies, state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools or hospitals.

Osage County is comprised of mostly rural land with occasional residences located throughout. Because of the rural character of the planning area, noise control ordinances are most likely not in place. Excessive artificial lighting is not a current concern for Osage County because of the rural character of the land. No lighting ordinances are in place for the county.

Visual

The visual character of the planning area is a function of the terrain, land cover, and land use. Osage County is generally rural with small farming communities and rural residences are scattered throughout. The planning area is dominated by agricultural fields, woodlands, and pastures/grasslands. Highways, local roads, and railroads, multiple transmission lines, distribution lines, and other types of development occur, contributing to the overall visual character of the area. No designated scenic rivers or areas occur within the RMP planning area (National Wildlife and Scenic Rivers System 2012).

1.21 MITIGATION AND MONITORING

Many protective measures and procedures are described in this document and will be incorporated, as appropriate, into subsequent permits, leases and their associated NEPA documents. Monitoring of cultural resource impacts by qualified personnel is recommended on a case by case basis for all ground-disturbing activities. Each phase of construction and development through production would be monitored by the BIA and representatives of the Osage Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report would be developed by the BIA and the responsible lessee or applicant, that documents the results of monitoring in order to adapt the projects to eliminate any adverse impact on the environment.

Mitigation opportunities can be found in general and operator-committed BMPs and mitigation measures. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. The permit applicant will be required to implement, to the extent possible, BMPs in an effort to mitigate environmental concerns in the planning phase, thereby allowing for smoother analysis, and possibly faster project approval. Many of these are required by the BIA when drilling federal or tribal leaseholds and can be found in the surface use plan in the APD. The regulatory agencies provide Conditions of Approval and enforcement would occur as a result of non-compliance which adds incentives for strict adherence to the BMPs.

14.22 GENERAL BMPS

Although largely project-specific, there are a number of BMPs that can, and should, be considered on development projects in general. The following comprehensive list contains general BMPs that may be implemented to protect important resources within the project area. As the proposed action is not yet known, the final list of BMPs will be decided on a case-by-case basis during the completion of a subsequent NEPA document for each federal action.

- Planning roads and facility sites to minimize visual impacts.
- Using existing roads to the extent possible, upgrading as needed.
- Reducing the size of facility sites and types of roads to minimize surface disturbance.
- Minimizing topsoil removal.
- Stockpiling stripped topsoil and protecting it from erosion, by seeding with native grasses, until reclamation activities commence. At that time, the soil would be redistributed and seeded on the disturbed areas. The reclaimed areas would be protected and maintained until the sites are fully stabilized.
- Avoiding removal of, and damage to, trees, shrubs, and groundcover where possible.
- Clearing a facility or well site to accommodate vehicles or equipment.
- Maintaining buffer strips or using other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Planning for erosion control.
- Storing chemicals properly (including secondary containment).
- Keeping sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Conducting snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.

- Avoiding or minimizing topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Maintaining buffers around work areas where there is a risk of fire as a result of construction activities.
- Keeping fire extinguishers in all vehicles.
- Planning transportation to reduce vehicle density.
- Posting speed limits on roads.
- Avoiding traveling during wet conditions that could result in excessive rutting.
- Painting facilities a color that would blend with the environment.
- Practicing dust abatement on roads.
- Re-contouring disturbed areas to approximate the original contours of the landscape.
- Developing a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.
- Locate the proposed well pads and utility corridors in areas with existing disturbances to the extent possible.
- Install covers under drip buckets and spigots.
- Use a closed-loop drilling system where there would be no pit unless there is an emergency. Any fluids and cuttings would be transported off site to be disposed of at an approved facility.
- Construct berms and install straw wattles on the downslope sides of the proposed well pads.
- Follow the contour (form and line) of the landscape.
- Co-locate multiple utility lines in the same trench.
- Use natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.
- Paint facilities a color that would blend with the environment.
- Contour disturbed areas to approximate the original contours of the landscape.
- Implement proper storage of chemicals (including secondary containment).
- Keep sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Avoid or minimize topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Keep a watering truck on site and water the access roads as necessary, especially during periods of high winds and/or low precipitation.
- Avoid construction and vehicle use during wet conditions that could result in excessive rutting.
- Avoid removal of, or damage to, trees and woody shrubs where possible.
- Conduct interim reclamation of at least half the disturbed area.
- Conduct reclamation without delay if a well is determined to be unproductive, or upon completion of commercial production.
- Lay matting and/or conduct hydro seeding on the fill side of the pads.
- Grind trees and other woody material removed from the pads and add to the topsoil.
- Minimize topsoil removal and stockpile stripped topsoil and protect it from erosion until reclamation activities commence.

- During reclamation, redistribute and seed the topsoil on the disturbed areas, and protect and maintain reclaimed areas until the sites are fully stabilized.
- Develop a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.
- Maintain buffer strips or use other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Implement an erosion control plan.
- Implement a Storm Water Pollution Prevention Plan and BMPs for the construction of the access roadway and proposed well pad to prevent erosion and sedimentation.
- Design roads and facility sites to minimize visual impacts.
- Use existing roads to the extent possible, upgrading as needed.
- Minimize the size of facility sites and types of roads to reduce surface disturbance.
- Avoid locating ROWs on steep slopes.
- Share any common ROWs whenever possible.
- Plan transportation to reduce vehicle density.
- Post speed limits on roads.
- Require construction crews to carry fire extinguishers in their vehicles and/or equipment.
- Require construction crews be trained in the proper use of fire extinguishers.
- Contract with the local fire district to provide fire protection.

The Applicant may be required to implement these and/or other BMPs to the extent that they are technically feasible and would add strategic and measurable protection to the project areas, as well as all specific items identified at the on-site inspections for the proposed well pad and utility corridor.

14.23 MITIGATION AND SAFETY MEASURES COMMITTED TO BY APPLICANTS AND LESSEES

Air Quality

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
  - Use directional drilling to drill multiple wells from a single well pad;
  - use centralized water storage and delivery, well fracturing, gathering systems;
  - use telemetry to remotely monitor and control production;
  - use water or dust suppressants to control fugitive dust on roads;
  - control road speeds; and
  - use van or carpooling.
- Drilling BMPs to reduce rig emissions
  - Use cleaner diesel (Tier 2, 3, and 4) engines;
  - use natural gas-powered engines; and
  - use "green" completions to recapture product that otherwise would have been vented or flared.
- Unplanned or emergency releases
  - Use high-temperature flaring if gas is not recoverable.

- Vapor recovery
  - Use enclosed tanks instead of open pits to reduce fugitive VOC emissions; and
  - Use vapor recovery units on storage tanks.
- Inspection and maintenance
  - Use and maintain proper hatches, seals, and valves;
  - optimize glycol circulation and install a flash tank separator;
  - use selective catalytic reduction; and
  - Replace high-bleed with low-bleed devices on pneumatic pumps.
- Monitoring and repair
  - Use directed inspection and maintenance methods to identify and cost-effectively fix fugitive gas leaks.

Dust Control

During construction, a watering truck may be kept on site and the access roads would be watered as necessary, especially during periods of high winds and/or low precipitation.

Utility Lines

All utility lines, including gathering pipelines, and electric and fiber optic lines, essential to oil well operations, would be installed underground.

Fire Control

The applicant or lessee would implement fire prevention and control measures including, but not limited to:

- requiring construction crews to carry fire extinguishers in their vehicles and/or equipment;
- training construction crews in the proper use of fire extinguishers; and
- Contracting with the local fire district to provide fire protection.

Traffic

Construction personnel would stay within the approved ROW or would follow designated access roads.

Closed-Loop System

The applicant or lessee commits to using a closed-loop system for the proposed well pad locations.

Cultural Resources

The Applicant will recognize the need to protect cultural resources on the project locations and has committed to the following.

- Prohibiting all project workers from collecting artifacts or disturbing cultural resources in any area under any circumstances.
- Avoiding impacts to National Register-eligible or unevaluated cultural resources on well sites and access roads. If cultural resources are discovered during construction or operation, work shall immediately be stopped, the affected site secured, and BIA and THPO notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.

Noxious Weed Control

A noxious weed survey would be conducted prior to construction covering the well pads, access roads, and utility corridor ROWs. The applicant would control any noxious weeds within the ROW and other applicable facilities by approved chemical or mechanical methods, according to the weed management plan developed by the BIA to treat known or likely to occur noxious weed species.

14.24 CUMULATIVE IMPACTS

14.25 HYDROLOGY

No surface discharge of water would occur under the Proposed Action, nor would any unpermitted use of surface water or groundwater occur as a result of project development. The Proposed Action, when combined with other future actions, such as cattle grazing, other oil and gas development, and agriculture in the CIAA would tend to increase sedimentation and runoff rates.

Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in nearby watersheds. However, any potential increase in degradation would be reduced by the commitment of the Applicant to minimizing disturbance, using erosion control measures, and implementing BMPs designed to reduce impacts.

14.26 ACCESS ROADS

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The proposed workover permit would most likely not require new road construction, but if required, additional roads would add incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. New well field developments would be speculative until APDs are submitted to the BIA Osage Agency for approval. Additional wells are likely to be drilled in the same general area as the Proposed Action, using many of the same main access roads and minimizing the disturbance as much as possible.

14.27 EROSION CONTROL BMPS

If deemed necessary, the Applicant is committed to using BMPs to mitigate the potential effects of erosion. BMPs would include implementing erosion and sedimentation control measures, such

as installing culverts with energy dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars in conjunction with slopes, and planting cover crops to stabilize soil following construction and before permanent seeding takes place. Additional information regarding BMPs can be found in Section 14.17, Mitigation and Monitoring.

14.28 VEGETATION

Proposed workover operations are not anticipated to create a loss of vegetation as new ground disturbance would be kept to a minimum, however, if a loss of vegetation does occur it could create decreased ecological diversity of mixed-grass prairie habitat. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and further fragmentation, of mixed-grass prairie habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use mixed-grass prairie habitats. Such impacts could be partially offset by avoidance of previously undisturbed prairie habitats, as well as implementation of soil and vegetation mitigation measures and BMPs (Section 4.13). Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

14.29 WILDLIFE

Cumulatively, the potential impacts on various species and their habitats would be minimal. Currently, no adverse impacts have been identified for either Osage County, or the adjacent areas. The BMPs (Section 4.13) designed to protect individual species and classes of species of interest would also protect most of the remaining species both locally and cumulatively.

14.30 CULTURAL RESOURCES

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the proposal.

14.31 SOCIOECONOMIC

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action would result in an additional source of revenue for shareholders of the Osage Minerals Estate. Increases in employment would be temporary during the construction, drilling, and completion phases of the Proposed Action. Therefore, little change in employment would be expected over the long term.

No significant negative impacts are expected to affect any element of the human and natural environments; impacts would generally be low and mostly temporary from both a context and intensity standpoint. Current impacts from oil and gas-related activities are still fairly dispersed,

and the required BMPs (Section 4.13) would limit potential impacts. The cumulative impacts from activities on the Reservation are still limited enough to not appear to be significant.

14.32 RECLAMATION

The applicant would be committed to implementing interim reclamation of the utility of any necessary ground disturbance areas immediately following construction and completion. Implementation of both interim and permanent reclamation measures would decrease the magnitude of cumulative impacts.